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June 2001 ISSUE 133

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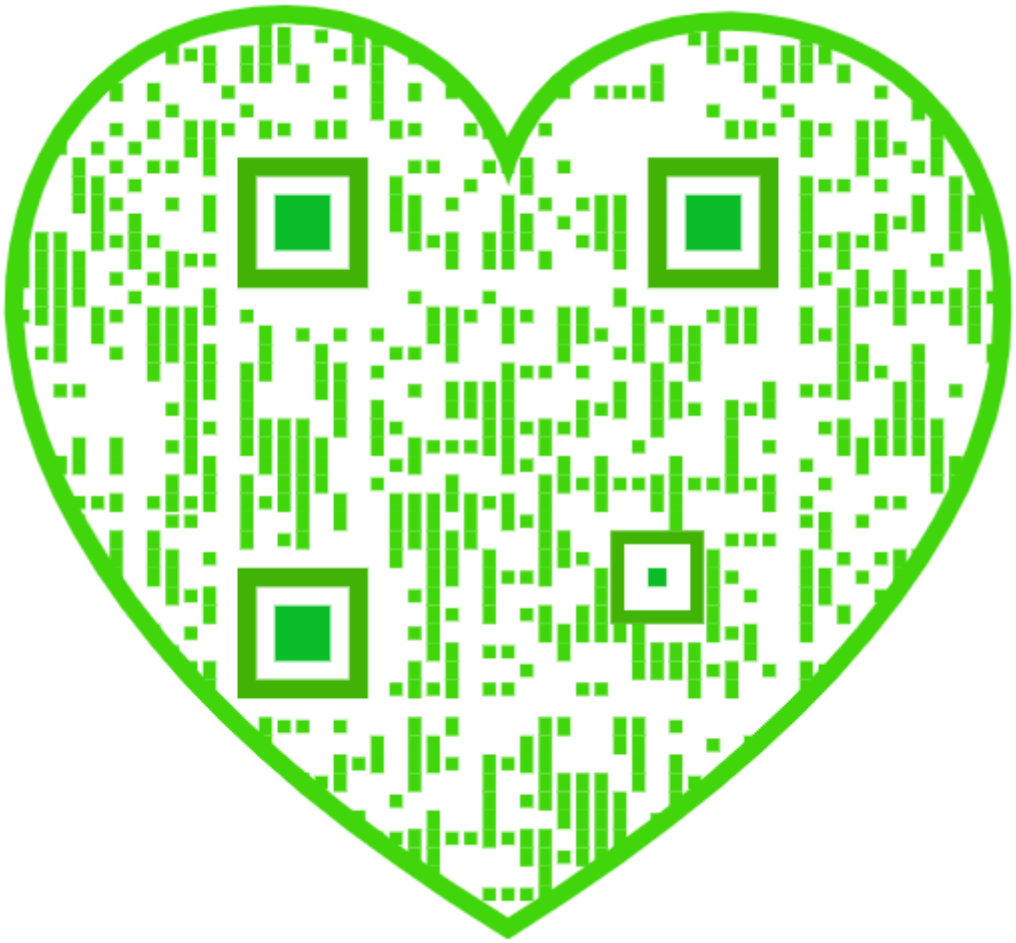

Better Homes and Gardens
WOOD®

MAY/JUNE 2001 • Vol. 18, No. 4 • Issue No. 133

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Better Homes and Gardens® **WOOD®** magazine (ISSN-0743-894X) is published nine times a year in February, March, April, May/June, July/August, September, October, November, and December by Meredith Corporation, 1716 Locust St., Des Moines, IA 50309-3023. Periodicals postage paid at Des Moines, Iowa, and additional mailing offices. Better Homes and Gardens trademark registered in Canada and Australia. Marca Registrada en México. **ONE-YEAR SUBSCRIPTION PRICES:** U.S. and its possessions, $27; Canada, $39; other countries, $47. Canada Post Publications Mail Sales Product Agreement No. 1369350. Canadian BN 12348 2887RT. **CANADIAN RETURN ADDRESS:** Better Homes and Gardens **WOOD** magazine, 2744 Edna Street, Windsor, Ontario, N8Y 1V2. **POSTMASTER:** Send address changes to Better Homes and Gardens **WOOD** magazine, P.O. Box 37439, Boone, IA 50037-0439.

built to last...
veteran's workbench

When a pro like our *WOOD®* Shop Manager Chuck Hedlund designs and builds a workbench, you can bet he means business. With 35 years of workshop experience under his tool belt, he knows what features work best in a full-service bench. Too, he knows what he doesn't like. Says Chuck, "I worked around benches that stood on wobbly legs and ones that moved when you applied the least bit of pressure, say, from handplaning a vise-held workpiece. My design solves those problems while giving me a whole lot more." As you can see *above* and beginning on *page 72*, this labor of love may have hit the mark dead center.

Shop Manager Chuck Hedlund reviews the plans of his full-service side-draft workbench.

Talk about hefty—Chuck's workbench weighs in at more than 200 pounds, thanks in part to the medium-density fiberboard (MDF) benchtop and framework. No way is it going anywhere. "Nice thing about a MDF benchtop," Chuck says, "is that it provides a smooth, flat surface, costs less than a hardwood top, and can be replaced easily." Nothing wrong with that.

Chuck's workbench also provides ample storage. In addition to the cabinet areas, you have a sliding vertical drawer with adjustable shelves for holding portable power tools, and a roomy horizontal drawer for hand tools and miscellaneous. Both open on each side of the cabinet for maximum accessibility.

My favorite feature of all, however, is the side-draft dust collector built right into the bench, creating an environmentally friendly sanding station complete with a detachable nonslip mat and benchtop hold-downs. Throw in the electrical strips for portable and benchtop power tools, and you have yourself the end-all, be-all workbench of which woodworking dreams are made. Way to go Chuck. Readers, it's all yours.

Jim Harrold

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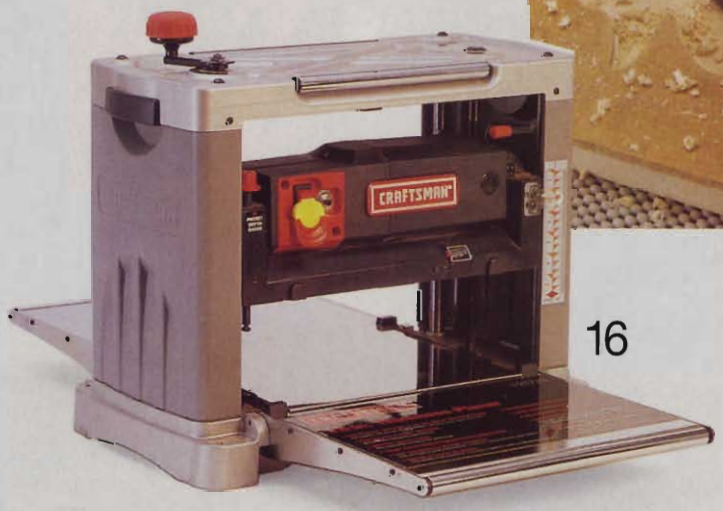
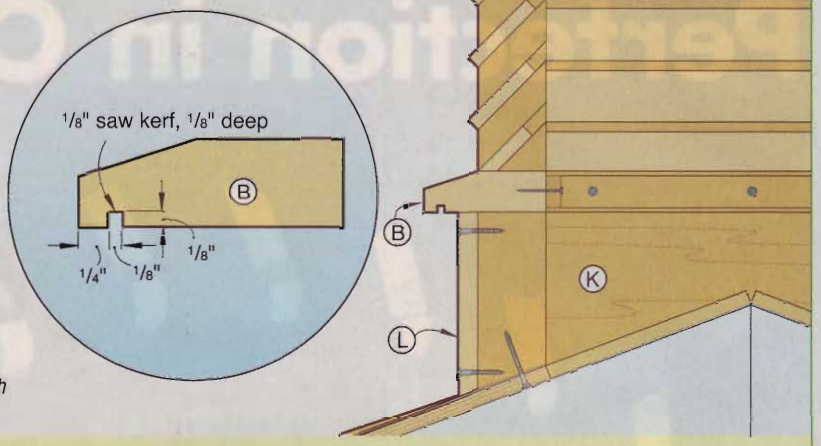
Cover photo: **Baldwin Photography**



Add a well-placed kerf to the cupola

The design of the cupola in issue 126 is simple, direct, and functional. I'll be building two such vents for my own shop. I recommend adding one small detail, a waterstop, under the sills (B). Just cut a ⅛"-deep saw kerf in the bottom of the sills, ¼" from the front edge, where shown. Water will drip from the sills at the kerf rather than running back to the joint between the sills and the sides (K) and ends (L).

—Lou Whatcott, Salt Lake City, Utah



Don't bore into golf balls

A tip we published in issue 128, drilling into a golf ball to make a handle for a small C-clamp, has raised safety concerns due to the potential for debilitating eye injury. Several golf ball manufacturers we contacted stated that although the liquid cores contain nothing more than salt water and corn syrup, they are under extreme pressure. Even ordinary water, under high pressure, can cause eye injury.

According to these manufacturers, there is no way to distinguish a solid-core golf ball from a liquid-core one from the outside. Only the labeling on the original box can tell you for certain, and that same label in many cases warns not to drill into a liquid-core ball.

We still believe that the basic idea of the tip, using a ball as a handle, is good. Just use an unfinished hardwood ball instead of a golf ball.

Shop-Vac points out tool-test errors

I would like to call attention to an error in your review of shop vacuums in issue 129. All wet/dry vacuums use bypass motors, not just the Fein unit. A unit with a flow-through motor cannot be used to pick up water. And all the units you tested have fans to cool the motor.

The significant difference between the Fein and all the other units is that the Fein uses a dual-impeller blower. All the other vacuums have single-impeller blowers. It is this difference that gives the Fein greater lift and quieter operation, but also adds to its cost.

Note also that the Shop-Vac QSP PRO is now supplied with a lock-on hose.

—Larry Tempesco, Shop-Vac

Pastry stand; a short bit doesn't cut it

I tried to rout the trays for the pastry stand in issue 126 with the Woodtek bit specified. Even with the router chuck set as close to the guide bushing as possible, only ¼" of the bit is held in the collet. Bosch makes a bit with the same profile (no. 85467M), but it has a ⅜"-longer shaft. For this operation, the Bosch bit is a safer choice.

—Jeffrey West, Tomahawk, Wis.

Thanks for catching our mistake, Jeffrey. Bosch router bits are mainly available through power tool distributors, and woodworking specialty stores. If you can't find this bit locally, you can mail-order it from Puckett Tools and Fasteners, 515/244-4189.

Write Us!

We welcome your comments, criticisms, suggestions, and yes, even compliments. Please write to: **Talking Back, WOOD magazine, 1716 Locust St., GA310, Des Moines, IA 50309-3023** or email us at **talkingback@mdp.com**.

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templates for success

A straight router bit can cut out just about any shape you want. All it needs is a little guidance from you.

The first time you use a router, you're delighted to realize that it's capable of doing almost anything you want it to do. Soon after that, you're dismayed to realize that it's also capable of doing what *it* wants to do, such as veering off course when you try to freehand it along a line.

This is where templates enter the picture. You can turn a humble piece of hardboard into the template, or pattern, for a decorative design, structural part, geometric feature, or any other shape.

Avoid intricate shapes when choosing a routing template. Then, cut out the pattern as smoothly as possible; your template guide will follow your cut exactly.

As you make the template, you can fuss over the details until they're just right, or toss it and start again. Once you perfect the template, you can use it to produce the same shape, and you can do it countless times.

When you rout a raised shape onto the surface of a project, the grain flows without interruption. That gives you a well-crafted effect that you can't get by cutting out the shape with a scrollsaw and gluing it on.

Template routing comes in handy for all kinds of applications, such as lettering, inlays, and shaping identical furniture parts. Here, we'll discuss how to make decorative shapes.

Choose your equipment

Template guide bushings turn your router into a pattern follower. A guide consists of a round plate that attaches to the router subbase and a tube, or bushing, that protrudes below. The cutting end of the bit projects through the bushing, and the outer rim of the bushing rides along the edge of the template.

Template guides come in two basic styles, as shown on *page 12*. The most common type screws into place and fits a wide range of router brands and models. The other clicks neatly into place—but fits only Bosch routers. In both styles, you can buy several sizes of bushings to correspond with router bits of various diameters.

Woodcraft (800/225-1153) carries a threaded brass set, part number 127110, with seven guides for $32.50 and a threaded, steel set from Porter-Cable, part number 04F52, also with seven guides for $39.99.

Continued on page 12

A seven-piece set of Bosch "Clic" template guides, part number RA1125, is available for $29.99. Call Highland Hardware at 800/241-6748. The set includes an adapter that allows you to put threaded guides on Bosch routers, too.

A plunge router does a great job in template work, and becomes especially valuable when you want to save both the "positive" shape that you cut out and the "negative" shape that's left behind. We'll return to that concept in a minute.

The plunge design allows you to start and stop each cut vertically. With a fixed-base router, you're almost certain to create a slight imperfection as you pivot the bit into place.

Make your preparations

In most cases, ¼" tempered hardboard makes the best choice for template material. It's inexpensive and easy to work with.

How are you going to draw the shape you want? If you're not too handy with a pencil, you can find lots of useful samples from scrollsaw pattern books and kids' coloring books.

Print out the shape, trace it, or copy it on a photocopying machine. Doing this enables you to enlarge or reduce it. Remember that the diameter of the template bushing limits your ability to rout into narrow slots and sharp inside curves. You might have to modify the shape slightly.

Affix this pattern to your template material with spray adhesive. Cut around it with a scrollsaw. To make usable positive and negative pieces, drill a 1/16" hole on the pattern line, thread your scrollsaw blade through, and begin to cut, as shown in the photo on *page 10, bottom*. You'll have a positive template that you can use to make a raised shape, and a negative one that's suitable for making a recessed version of that same shape. After completing the cut, remember to file or sand smooth the tiny dent left by the starter hole.

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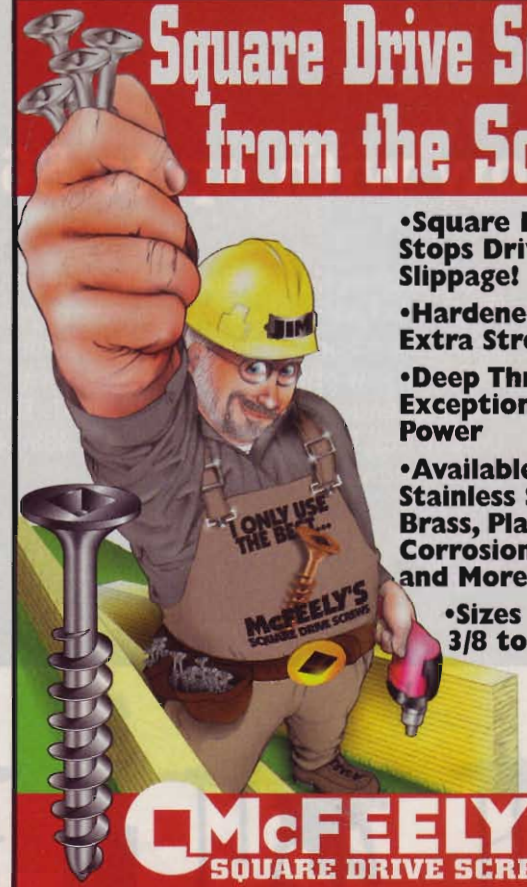

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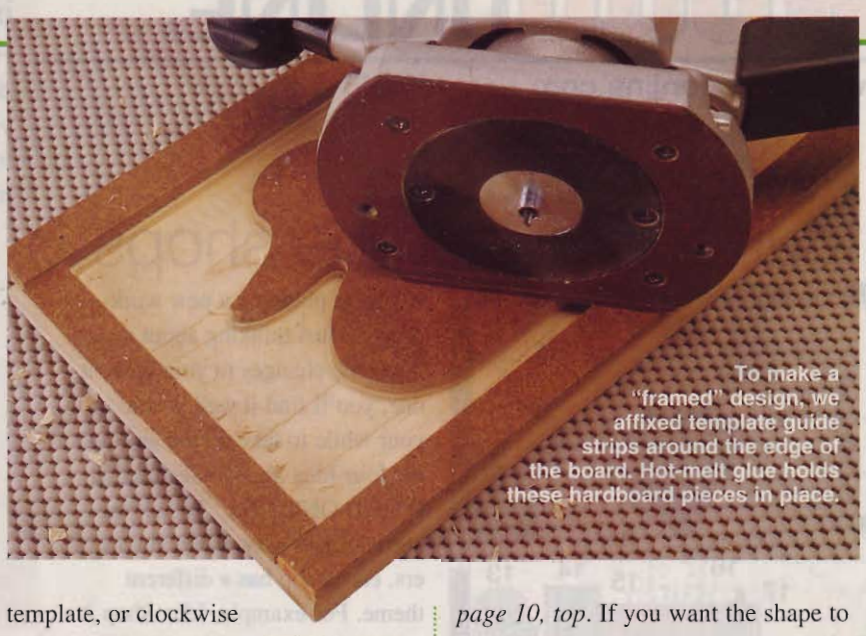
If you don't have a scrollsaw, take great care with a handheld jigsaw, and finish up with a coping saw if necessary. Carefully clean up any rough spots with files and sandpaper to guarantee a smooth finished product.

Now, cut it out

A rubber or foam pad will hold your workpiece in place on your benchtop while you rout. Stick the template on the workpiece with a few dabs of hot-melt glue. If you're going to rout all the way through the workpiece, attach it to a backer board with hot-melt glue.

Use a straight or spiral upcut bit with the same cutting diameter as the bushing to produce a piece nearly the same size as the template. Or, try a V-groove bit to create a carved look. Set your bit to the desired depth, and rout counterclockwise around a positive-image template, or clockwise around the inside of a negative-image template. Make sure to keep the bushing pressed firmly against your template at all times.



To make a "framed" design, we affixed template guide strips around the edge of the board. Hot-melt glue holds these hardboard pieces in place.

To make a recessed shape, use the arrangement shown in the photo on *page 10, top*. If you want the shape to stand proud of the surface, go with the set-up shown in the photo *above*. Once you're done routing, pop the template off the workpiece with a chisel.

Written by **Jim Pollock with Jim Heavey**
Photographs: **Baldwin Photography**

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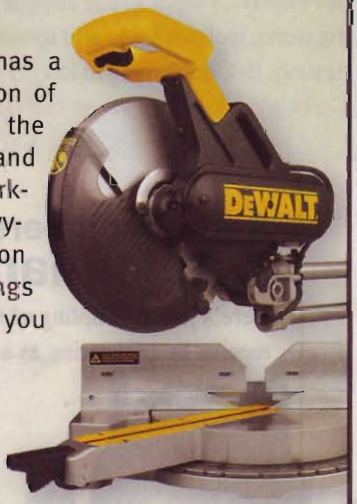

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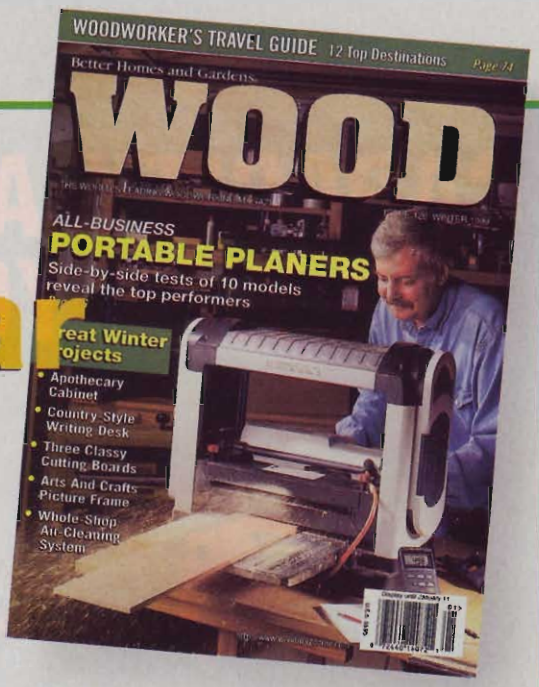

new portable planers raise the bar

Three manufacturers offer upgraded machines

The last time we took a hard look at portable planers (issue #120), we promised an in-depth look at updated models from Makita and Ryobi that weren't ready for testing when we went to press. Well, we've got good news and bad news.

The bad news is, a Ryobi official told us they've shelved their planned upgrade of the AP12 in favor of a completely redesigned portable planer. No date has been set for its release. The good news is that, besides Makita's 2012NB, Craftsman's 21713 and Grizzly's G8794 have also joined the thicknessing fray.

All three machines turned in virtually snipe-free performances, as you can see from the chart on *page 18*. Sadly, none of the new planers come with a dust hood as standard equipment, although all offer one as an accessory. To bring you up to speed, let's take a look at the new models, one by one.

Craftsman 21713

Craftsman engineers must think 13 is their lucky number, because their new planer can handle stock up to 13" wide. That ties Ridgid's TP1300 for the largest capacity in a portable planer. And the 21713's extension tables provide a total work-support length of 37"—more than 13" longer than their previous model and current planers by Delta, Grizzly, and Jet.

They've also added a depth-stop turret that allows you to quickly size to five different thicknesses: ⅜", ½", ¾", 1", and 1¼". To make sure you don't take too much wood in one bite, a depth-of-cut gauge shows how much you'll remove with your next pass. The Craftsman 21713 has plenty of power to handle all the cuts we threw at it without bogging down.

Perhaps the biggest improvement, though, is the switch to double-edged, pin-located knives. On Craftsman's previous portable planer, we needed a knife-setting gauge and about 20 minutes of free time to change knives. The new design cut that time to five minutes, yet still allowed us to shift the knives laterally to correct for a dinged knife. All of the tools store right on the machine, so we never had to hunt.

And here's one feature we've not seen anywhere else: You can switch the head-elevation crank to whichever side of the machine suits your style of working best. We liked the idea, but the depth scale is only on one side, so we still had to lean across the machine to check our stock thickness.

Craftsman 21713

Speaking of thickness, we were surprised to find that this model couldn't surface stock less than ½"-thick. You could go thinner by using a carrier board, but that off-the-shelf limitation is disappointing because most portables these days go down to ⅛".

Grizzly G8794

We like quick-to-change, self-aligning knives, so we were sorry to find the new Grizzly planer still requires the use of a knife-setting jig to set or adjust the knives. However, unlike the G1017, which this model replaces, the G8794 comes with double-edged knives. That means you can go twice as long between sharpenings.

In spite of this planer's lack of a head lock, it turned in a low-snipe performance. We found only .001" while taking 1/16", and about .002" after removing an overly aggressive 3/32".

At the time we tested the G8794, the $280 (plus shipping) price

Continued on page 18

Grizzly G8794

tag included a sturdy Shop Fox stand that normally sells for $40. If you leave the planer on this stand, you'll never have to deal with the only annoyance we found: The extension tables don't fold up unless you crank the head up to the top one-quarter of its travel.

Makita 2012NB

Virtually the last major portable planer to switch from a fixed-head to a fixed-table design, Makita's new four-post machine has finally joined the club. That's not to say, though, that this machine is simply a knockoff of the other four-post planers.

For example, the 2012NB uses an internal head-locking mechanism that requires no effort on the part of the user to activate. And, instead of a depth-stop turret with several preset thicknesses, Makita engineers added a threaded-rod depth stop with a half-nut quick-release. Get close with the half-nut, then turn it by hand to fine-tune the final thickness.

From the factory, we were once again impressed by the sharpness of the double-edged disposable knives. However with this new model, Makita ships the same long wrench they shipped with the old 2012, and it's a bit too long for the new design (unless you crank the head to within about ¾" of the table). And the power cord got in the way of the wrench when we changed knives. We did like the removable on-board toolbox for the wrench and magnetic blade handlers.

Although we're not able to do long-term endurance testing, this planer appears to be built to last. First, unlike other four-post machines, the 2012NB has a diagonal steel brace inside each side cover that provides exceptional rigidity and reduces the risk of snipe. And the infeed and outfeed rollers are made of a tough polyurethane material, which should prove more durable than the rubber rollers used on other portable planers.

Makita 2012NB

You'll pay a price for that toughness, though. This Chinese-made machine retails for about $500—about $50 more than the Taiwanese-built machine it replaced.

Written by **Dave Campbell** with **Dave Henderson**
Photographs: **Douglas Smith**

PORTABLE PLANERS POSTSCRIPT

MANUFACTURER/ IMPORTER	MODEL	CUTTING CAPACITY: MINIMUM THICKNESS (INCHES)	CUTTING CAPACITY: MAXIMUM THICKNESS (INCHES)	TABLE LENGTH WITH EXTENSIONS (INCHES) (1)	KNIVES (2)	DEPTH-OF-CUT LOCK (YES, NO) (3)	STABILIZATION MECHANISM (4)	EASE OF KNIFE CHANGING	PERFORMANCE RATINGS (5): CUTTERHEAD PARALLELISM	KNIFE PARALLELISM (6)	SNIPE DEPTH @ 1/16" CUT (AVERAGE)	AMP DRAW @ NO-LOAD	AMP DRAW @ 1/16" CUT	AMP DRAW @ 3/32" CUT	HEAD SPEED RPM: NO-LOAD/LOAD (1/16" CUT)	PORTABILITY	WEIGHT (POUNDS)	WARRANTY (YEARS)	COUNTRY OF ASSEMBLY (7)	SELLING PRICE (8)	COMMENTS
CRAFTSMAN	21713	1/2	6	37	DESA	Y*	FSP/HL	E	.002	.001	.001	4.96	8	11.9	10,400 / 8,400	F	85	1	T	$380	13" capacity and 37" table length are largest in test. A very good, feature-filled planer for the money.
GRIZZLY	G8794	3/16	6	24 1/4	DE	N	FSP	F	.002	.002	.001	6.24	12.24	13.9	9,078 / 7,042	G	75	1	T	280*	Very good performer, in spite of the lack of head lock. Price includes stand.
MAKITA	2012NB	1/8	6 3/32	30 3/8	DESA	Y**	FSP	G	.002	.001	.001	4.4	9.4	11.7	8,530 / 6,300	G	59.5	1	C	499	We like the user-definable depth stop. The only planer in the test with steel cutterhead.

NOTES:

1. Total overall work support length.
2. (DE) Double-edge
   (DESA) Double-edge, self-aligning
3. (*) Also has depth-stop turret for standard thicknesses.
   (**) Internal head lock requires no user action. Also has variable depth stop.
4. (FSP) Four steel posts
   (HL) Head lock
5. E Excellent
   G Good
   F Fair
6. Measured before making any adjustments.
7. (C) China
   (T) Taiwan
8. (*) Plus $20 shipping, where applicable.

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800/523-4777
www.grizzly.com

edge sander

keeps hand-sanded edges crisp

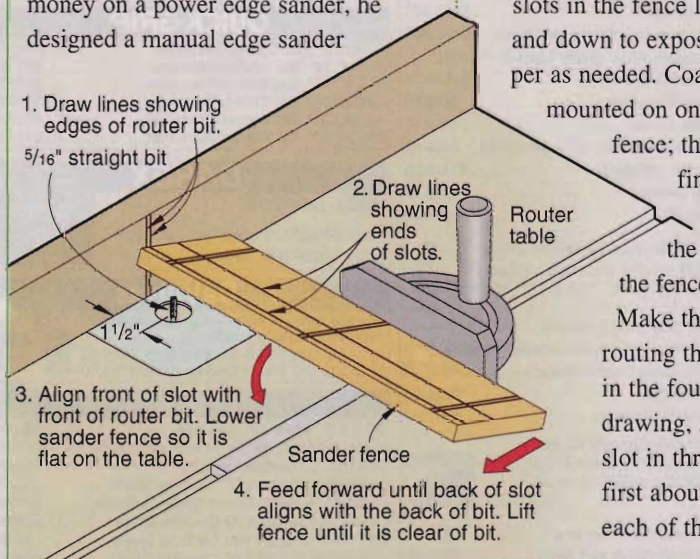
Sanding by hand often turns what should have been a crisp edge into one that's rounded and uneven. Reader Phil Otanicar says such round-overs are especially noticeable on the small projects he likes to make. Instead of spending money on a power edge sander, he designed a manual edge sander that clamps to his workbench.

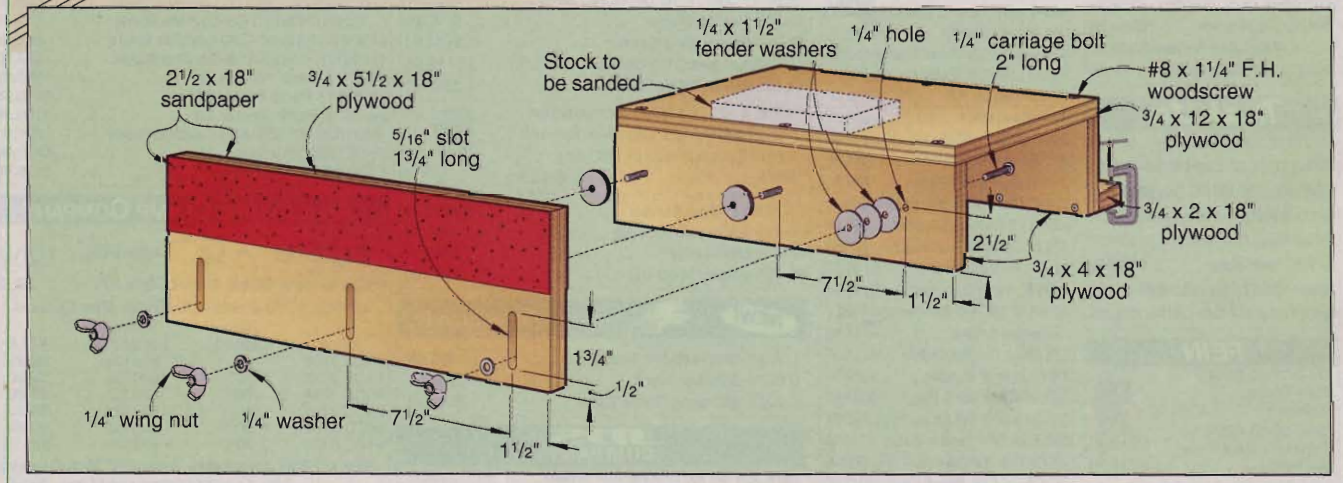
The 12×18" platform supports the piece while you guide it against sandpaper attached to a fence. Three slots in the fence let you slide it up and down to expose fresh sandpaper as needed. Coarse paper is mounted on one side of the fence; the other side has finer paper.

Sawdust falls into the space between the fence and platform.

Make the fence first, routing the slots as shown in the four steps of the drawing, *left*. Rout each slot in three passes—the first about ¼" deep, and each of the others about ¼" deeper than the one before. The fence should be symmetrical, so rout both end slots with the router fence and bit at the same setting. When you've finished the end slots, measure carefully, and reset the fence to rout the center slot. Once you've finished routing, lay out carriage-bolt holes in the platform using the slots as a guide. Apply a coat of gel varnish to protect the wood and reduce friction.

We bought 2½×180" rolls of pressure-sensitive adhesive sandpaper, cut 18" lengths, and stuck them to the fence. These rolls are available in 80–320 grit from Supergrit. Call 800/822-4003 for a catalog.


1. Draw lines showing edges of router bit.
5/16" straight bit
2. Draw lines showing ends of slots.
Router table
1 1/2"
3. Align front of slot with front of router bit. Lower sander fence so it is flat on the table.
Sander fence
4. Feed forward until back of slot aligns with the back of bit. Lift fence until it is clear of bit.



Written by **Jeff Day**
Project Design: **Phil Otanicar, Evergreen, Colo.**
Illustrations: **Roxanne LeMoine; Lorna Johnson**
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What is medium-density fiberboard?

Q Many of the projects in your magazine call for medium-density fiberboard, but I've been unable to find it. I'm curious as to what it is, how and when I should use it, and how I get it.

—Duane Pulliam, Chatham, Ill.

A Medium-density fiberboard, or MDF, has become one of the most popular composite materials in recent years, Duane. Because MDF is uniform, dense, smooth, and free of knots and grain patterns, it makes an excellent substitute for solid wood in many applications, except when the stiffness of solid wood is required, such as in a long bookshelf. Its smooth surfaces also make MDF an excellent base for veneers and laminates.

We use MDF anytime its heavy weight isn't an issue, and when we don't want wood grain showing, such as in painted projects. We used it to make the fireplace surround from issue 101 shown *right*.

Much like particleboard, MDF is made up of wood particles and resin. But these particles, which are cooked and pressure steamed, also get separated uniformly to make a fine, consistent material. Then the manufacturer binds the wood particles with an adhesive and heat presses the composite.

Because of MDF's consistent make-up, machining this material with the right tools results in clean, sharp edges without chip-out or fuzzing. Because MDF is more dense than most woods, manufacturers recommend only the highest quality tools be used to machine it. Most tool makers have specifically designed carbide, ceramic, or diamond tools for cutting MDF. Due to airborne wood particles and resin, be sure to use a dust mask and dust collection system when sanding and machining.

Tips for joining MDF include using yellow woodworker's glue and untapered sheet metal screws or production screws instead of wood screws. MDF panels hold screws as well as most natural woods, but drill a pilot hole first. You also can join this wood composite with spiral grooved dowels, coated staples, and ring shank nails.

This fireplace surround from issue #101 of *WOOD*® magazine was made of medium-density fiberboard.

Although most home centers now carry MDF, it is often called by other names such as Medite or furniture-board. It typically costs $17–$20 for a ¾"×4'×8' sheet.

Continued on page 24

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It's a crime to leave fingerprints

Q After putting gel stain on a project, I often wind up with a dark image of fingerprints—always in a conspicuous place, of course. What causes this, and how can it be prevented? And how can I remove these images from a finished project?

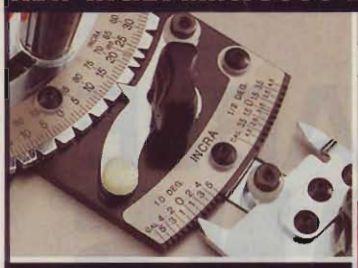
—William Witte, Las Vegas, Nev.

A You might be transferring excess stain from your fingers to the surface, Bill. Using gel stains is always a messy procedure, so wear finishing gloves, keep them as clean as you can, and be careful not to touch the surface while the stain remains wet.

If you've varnished over that stain, you'll have to strip the piece and refinish it to remove the fingerprints. But if you catch them right after the stain dries, you should be able to rub them out with lacquer thinner. That will produce a light spot that you'll need to touch up with a little more stain.

Contined on page 26

NEW INCRA Miter3000 Miter Gauge with 27" Flip-Stop Fence



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Circle No. 37

Nail holes really are a pain, so...

Q I'd like to have more control of color when filling nail holes and small imperfections in wood. I have used a mixture of wood glue and sawdust, but this doesn't work as well as a manufactured dough or filler. Is there a recipe for wood fillers?

—Louie Rebideaux, Sparks, Nev.

A Louie, we'd like to take this opportunity to encourage you to avoid creating nail holes in the first place. Carpenters use nails, cabinetmakers use glue. When you absolutely have to use a nail or screw, try to keep the hole hidden away on the back or underside of your project.

There, we got that off our chest. When you must fill a hole, use a sander to make the finest sawdust possible, then mix it with clear epoxy, not wood glue. Or, if you plan to use wood dough, put a piece of tape on the wood, nail through it, then apply the dough before removing the tape. That keeps it from smearing onto the surrounding area and creating a splotch that will show through the finish.

Use a router to plane boards?

Q Just last night as I was working on a project, I needed a piece of wood that was 14" wide. I went out to my pile of roughsawn lumber and cut off a short piece from a slab of pine. It was too wide to go through my planer. So, I screwed two boards to the sides of the slab—this gave me a level surface that doesn't rock. Then, I put a ½" straight bit in my router. With the help of two pieces of angle iron that spanned the slab and side boards, I was able to "plane" the surface of the slab. This method takes a while, but it works so much faster than trying to hand-plane the piece, especially if it contains big knots.

—Rusty Personett, Flagstaff, Ariz.

A Although your method works, Rusty, our shop supervisor, Chuck Hedlund, feels it requires too much time and effort. He prefers to rip the roughsawn board into two or three pieces, joint and plane them, then glue them back together. If you carefully realign the grain during glue-up you won't be able to see the joint lines.

For readers interested in more information on planing with a router, see page 60 of issue 37 (September 1990) where we used this concept to create a flat area on log sections with a "shooting box" and router. We've also shown how to flatten a solid-wood workbench top using a similar procedure on page 10 of *WOOD* magazine issue 80 (August 1995).

—WOOD magazine

Got a question?

If you're looking for an answer to a woodworking question, write to: WOOD Forum, 1716 Locust St., GA 310, Des Moines, IA 50309-3023 or e-mail us at woodforum@mdp.com. For an immediate answer to your question, get help from fellow woodworkers by posting it on one of our Internet discussion groups at: www.woodonline.com.

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Circle No. 592

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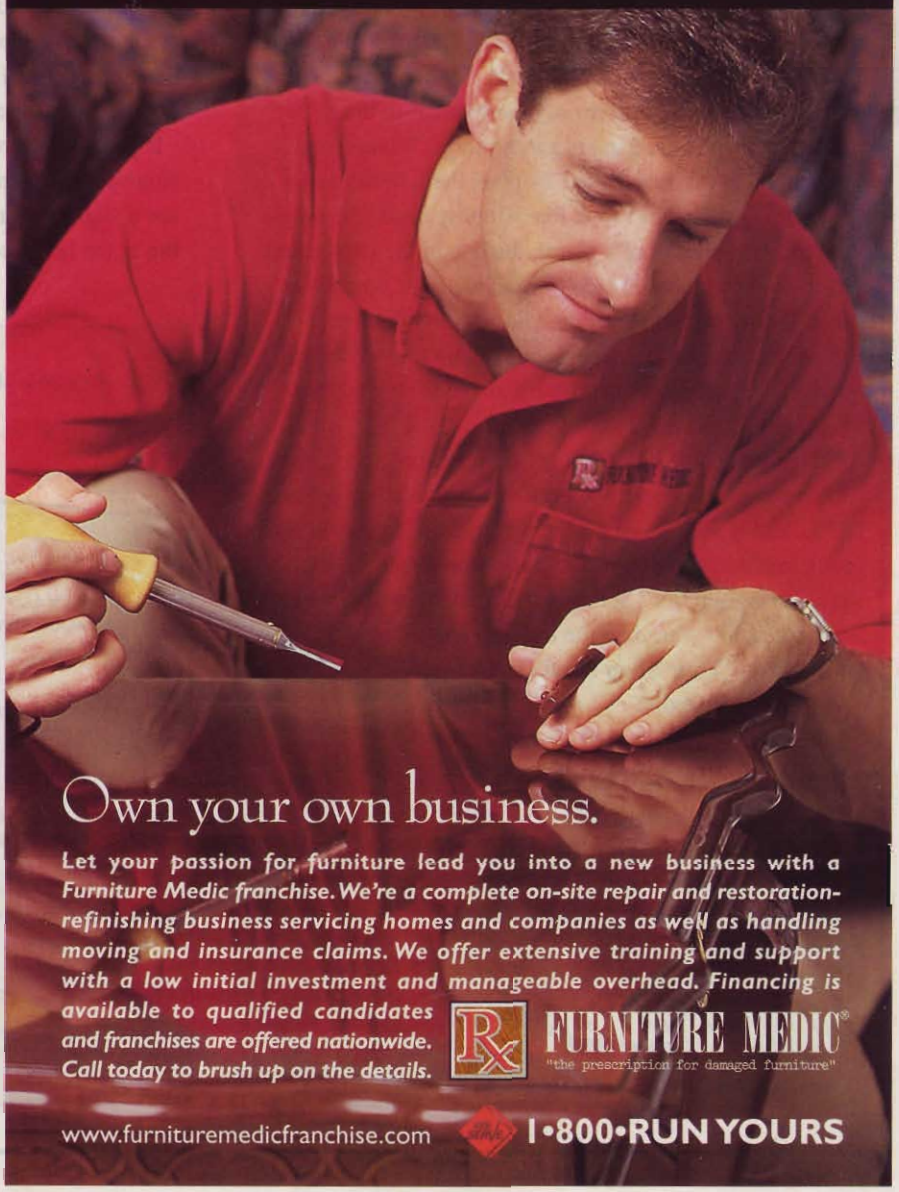

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Circle No. 1520

This issue's Top Shop Tip winner, Bruce Stahl, poses with a carved wooden friend. (That's Bruce on the right.)

Bruce Stahl will have to find room for one more tool in his shop. He'll receive a Grizzly G1182HW 6" jointer for sending in this issue's Top Shop Tip.

PHOTO: TIMOTHY RIFE PHOTOGRAPHY

Like many woodworkers, Bruce Stahl shares his shop space with cars, lawn mowers, and bicycles. But our Top Shop Tip winner only has himself to blame for the giant moose head in his garage shop. "I laminated about 250 pounds of planed 2× pine, then carved away everything that didn't look like a moose head," he quips.

Bruce's moose (that's plural, the one in the garage and the one shown *above*) aren't for sale. "I just do the carvings for my own satisfaction," he says. As you can imagine, those large carvings can cramp a woodworker's style, so Bruce came up with the space-saving table, at *right*, that stows easily.

Have you come up with a great tip in your shop? We'd like to hear about it. If we print your tip, we'll give you $75. And if we choose it as our Top Shop Tip, we'll also kick in a tool prize valued at more than $250. So what are you waiting for? Send your tips, along with drawings or photos and your daytime telephone number, to:

Tips From Your Shop (And Ours)
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Or post your tips on the WOOD ONLINE® Top Shop Tip discussion group at www.woodonline.com.

We try to print only original tips, so please send your tips only to *WOOD* magazine. Sorry, but we can't return your submission. Thanks!

Dave Campbell
WOODWORKING PRODUCTS EDITOR

TOP shop tip

Disappearing table works like magic

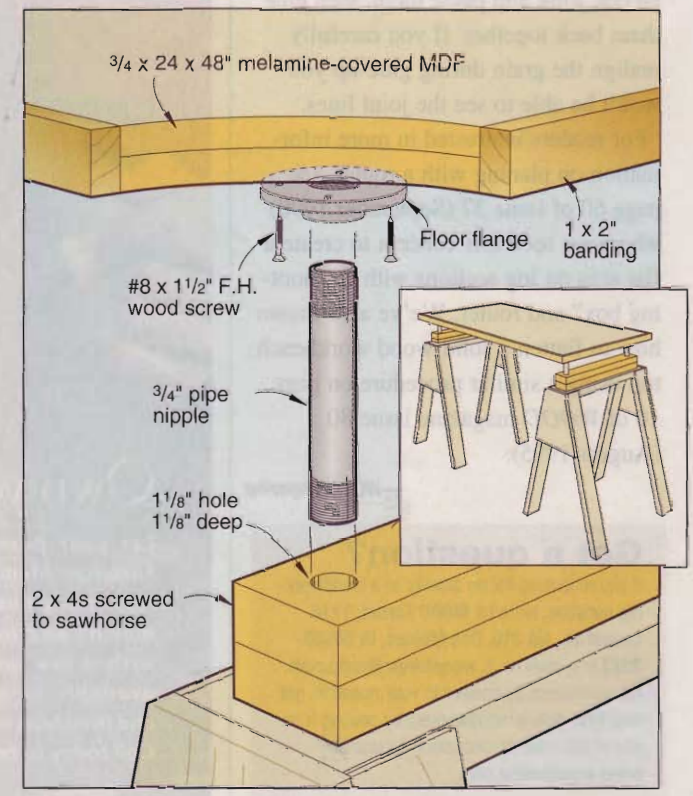
We've all seen magicians who can make even elephants vanish into thin air. But what I needed was a smaller trick: a sturdy worktable that would disappear when I didn't need it. Although my design isn't magic, it sure does the job.

I made my tabletop from two thicknesses of melamine-covered medium-density fiberboard (MDF), cemented face to face. Glue drips won't stick to the melamine, and that's a real plus when I use my table as an assembly bench. Edge banding dresses up the tabletop, and also makes it a bit more rigid.

The drawing *below* shows how I used inexpensive steel plumbing parts for the support system. By inserting different lengths of pipe nipple, I can easily adjust the height of the table. When I need to make the table disappear, I simply lift the top off the sawhorses and unscrew the nipples.

If you can afford the space, you could make a jumbo version of the design by using a solid-core door. I sometimes see a slightly damaged door at a bargain price in the reject bin at the home center.

—Bruce Stahl, Lincoln, Neb.


3/4 x 24 x 48" melamine-covered MDF
Floor flange
1 x 2" banding
#8 x 1 1/2" F.H. wood screw
3/4" pipe nipple
1 1/8" hole 1 1/8" deep
2 x 4s screwed to sawhorse

Hang on—you'll get hooked on this idea

I needed hooks to hang some Christmas ornaments I had scrollsawn, so I started fishing around my shop for a solution. I found the answer in a tackle box. The drawing *below* shows how easy it is to use wire cutters to transform a fishing hook into a hanger.

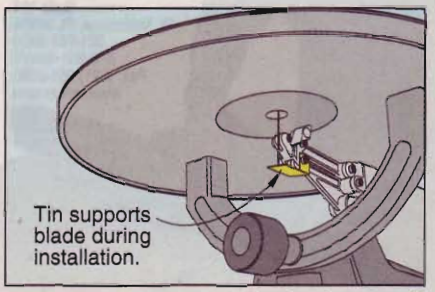
Leaving a little of the curve on the shank when you snip off the barb makes a great friction fit into a predrilled hole. A hook from a hook: some things seem completely obvious—after you finally figure them out.

—John Vieth, Buffalo Grove, Ill.

Veteran conquers blade-change challenge

Changing scrollsaw blades is a hassle for many people, but trying to do it one-handed is even more of a challenge. (I lost my left arm in World War II.) To solve the problem, I snipped a small metal support from a "tin" can and epoxied it to the lower blade holder. The drawing *below* shows where I attached it to my DeWalt scrollsaw, but you probably can adapt this idea to fit your saw.

—Robert Randall, Lansing, Mich.



Continued on page 30

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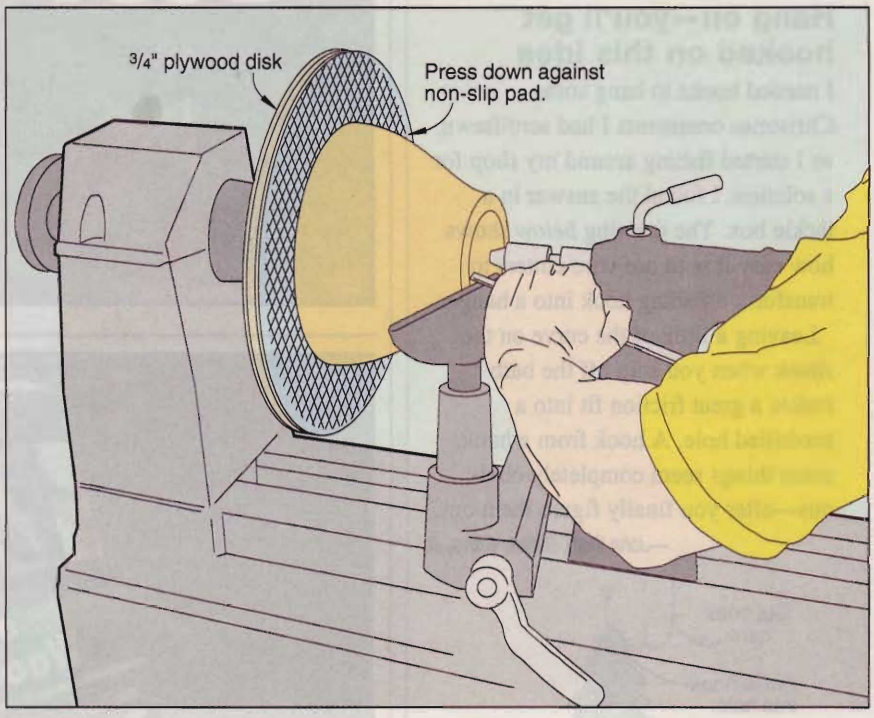
Circle No. 290

Step up to this jig for turning a bowl's foot

I've tinkered with a number of different methods for turning a foot on a bowl, but most of them involved complicated and time-consuming jigs. But then I took a more direct approach, and now I can complete the job in less time than it used to take to set up one of those old jigs.

To make my jig, I simply cut a plywood disk, then trued up its edge on the lathe. Then I used cloth-backed double-faced tape to attach a piece of non-slip router pad to the plywood. As shown in the drawing at *right*, a ball-bearing tailstock provides enough pressure to hold the bowl against the faceplate while I turn the foot. After turning, there's a little nub remaining in the center, but a Forstner bit and a 2" sanding disk get rid of it in a hurry.

—Wally Hild, Naperville, Ill.



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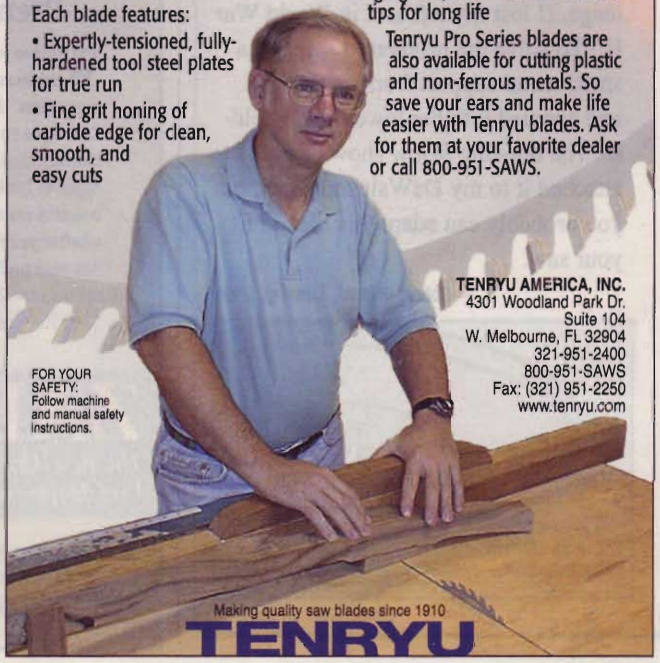

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Simple jig helps locate odd-spaced holes repeatedly

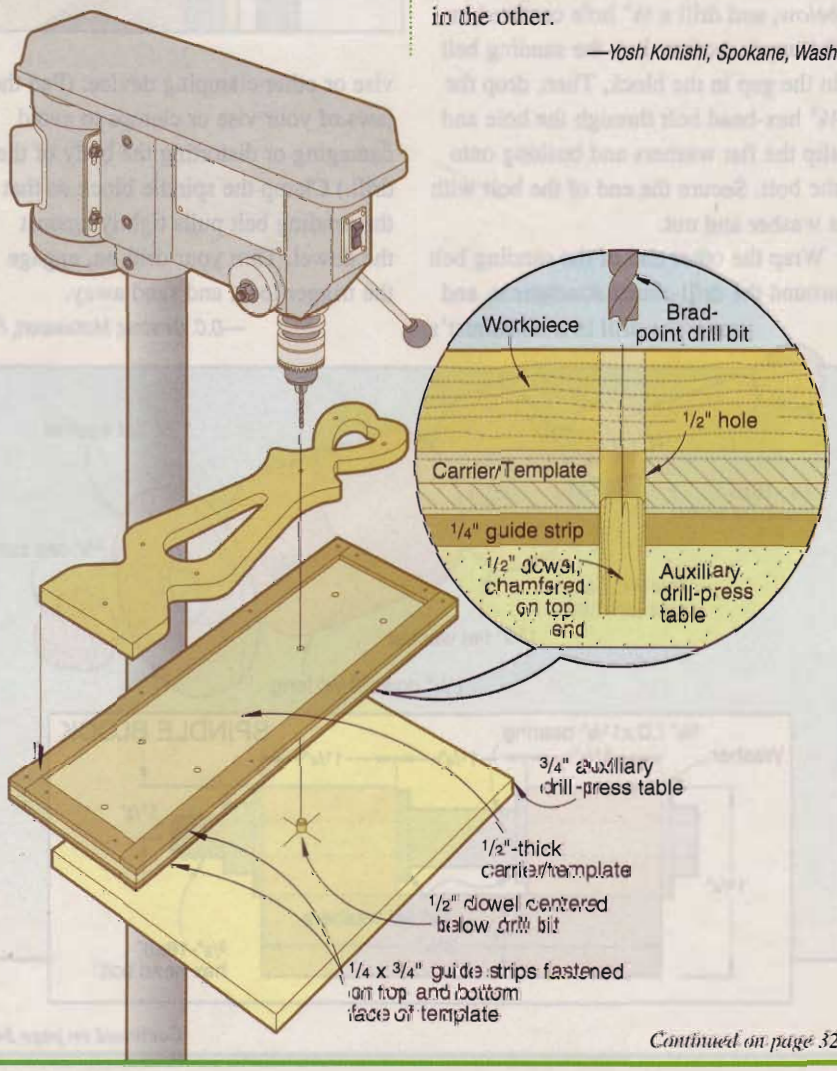
Boring matching holes in two or more workpieces can be tricky enough when you have a straight reference edge. But here's a jig I came up with that positively aligns holes in even the strangest-shaped parts. The positioning pin even lets you precisely bore partial-depth holes in left and right pieces.

Start by making a ½" plywood carrier with ¼"-thick stops along all four edges on both sides to capture the workpiece. On a sample scrap workpiece, mark the location of the holes you want to drill, put the sample in the carrier, and drill at each mark through both the sample and carrier with a ½" brad-point drill bit.

Now, attach a ¾"-thick auxiliary top to your drill-press table, and center a ½" hole ½" deep, as shown *below*. Glue a ⅞" length of ½" dowel, chamfered on one end, into the hole.

To set up the jig, place the empty carrier on the auxiliary table so that the dowel is in one of the locating holes, and set the bit's boring depth. (If you're going to drill completely through the workpiece, set the depth so the bit doesn't tear into the dowel.) Now place a workpiece on the carrier, slip a locating hole over the dowel, and drill. For partial-depth holes on left and right pieces, bore holes in one piece, then flip the carrier over and bore holes in the other.

—Yosh Konishi, Spokane, Wash.


Workpiece
Brad-point drill bit
½" hole
Carrier/Template
¼" guide strip
½" dowel, chamfered on top end
Auxiliary drill-press table
¾" auxiliary drill-press table
½"-thick carrier/template
½" dowel centered below drill bit
¼ x ¾" guide strips fastened on top and bottom face of template

Continued on page 32

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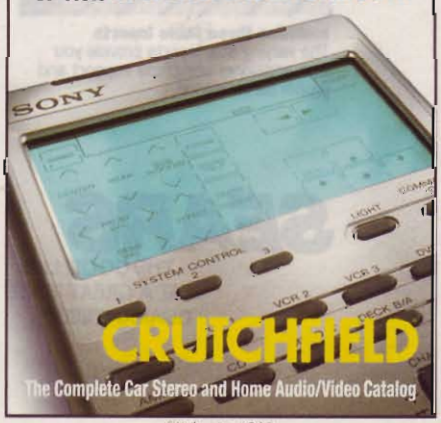

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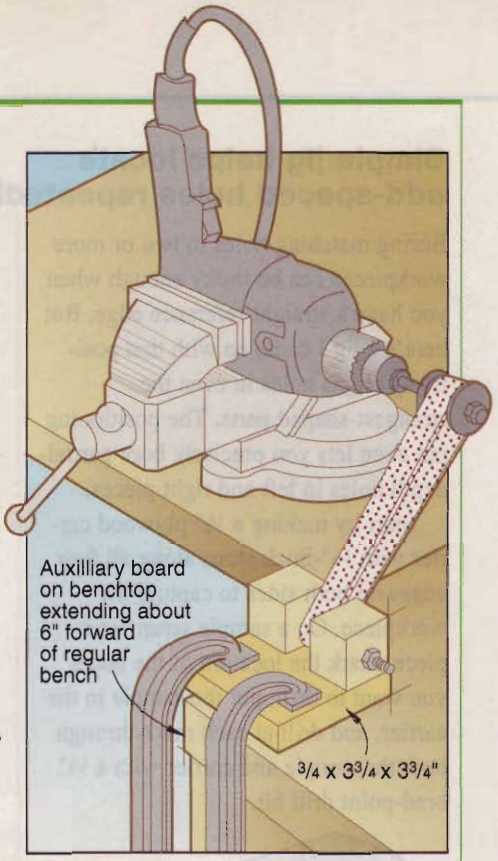
Turn your electric drill into a belt sander



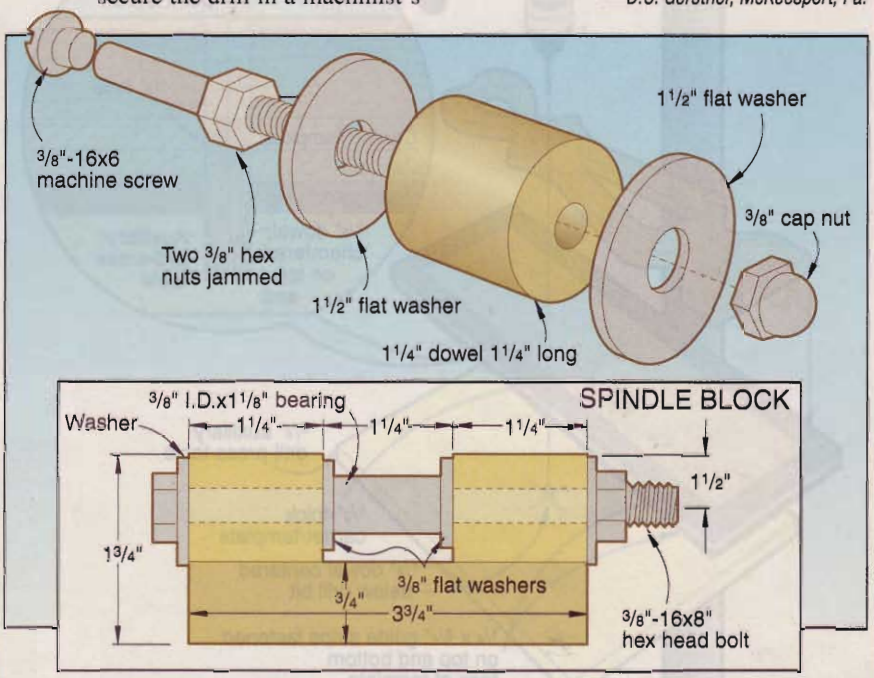
You can't beat a 1" belt sander for sanding small parts, but what if you can't afford one? You can turn an electric drill into a temporary belt sander for a few dollars worth of hardware.

Start by assembling the chuck attachment for the drill as shown in the drawing *below*. To keep the dowel from sliding back toward the chuck, thread two hex nuts onto the machine screw and then turn them in opposite directions so that they jam together. Install the washers, the dowel, and the cap nut on the end, cut off the head of the screw, and chuck the shaft into the drill.

Next, assemble the spindle block to the dimensions shown in the drawing *below*, and drill a 3/8" hole centered in the upper section. Lay the sanding belt in the gap in the block. Then, drop the 3/8" hex-head bolt through the hole and slip the flat washers and bushing onto the bolt. Secure the end of the bolt with a washer and nut.

Wrap the other end of the sanding belt around the drill-chuck attachment, and secure the drill in a machinist's vise or other clamping device. (Pad the jaws of your vise or clamps to avoid damaging or distorting the body of the drill.) Clamp the spindle block so that the sanding belt pulls tightly against the dowel. Turn your drill on, engage the trigger lock, and sand away.

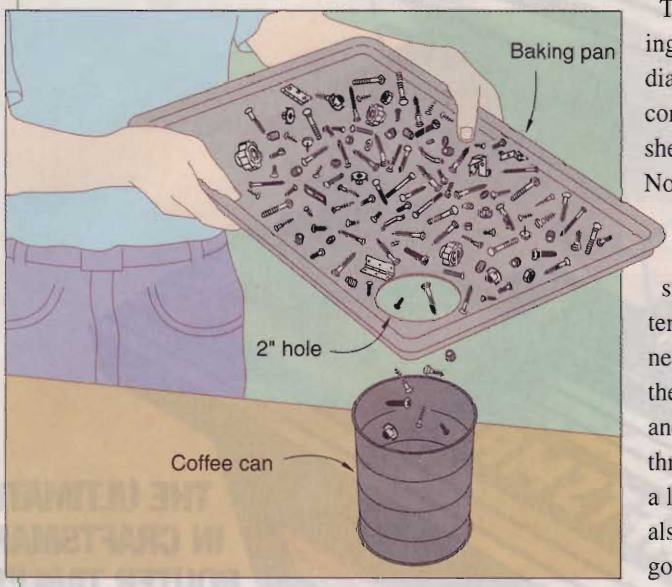
—D.C. Gerstner, McKeesport, Pa.



Continued on page 34

How to find the needle in your haystack of hardware

I have quite a few coffee cans filled with nuts, bolts, and other odds and ends that seem to have piled up over the years. When I have to dig through my collection, it's a pain (usually in the fingers).



To speed up the sorting process, I cut a 2"-diameter hole in one corner of an old cookie sheet, as shown below. Now, I just dump from a can onto the cookie sheet and sort through the contents until I find what I need. Then, I position the hole over the can and slide the contents through the hole. With a little practice you can also use "panning for gold" motions to slide the contents through the hole and back into the can.

—Frank Danuski, Warren, Pa.

A few more tips from our woodworking pros

- Squaring up the edges of small parts doesn't require a disc sander if you build the benchtop jig shown on *page 20.*
- Tired of shredding the heads of brass screws? Turn to *page 66* for a hard-headed solution.
- Even if you don't build our workbench on *page 72*, you'll want to see how we built its detachable top. You can build one like it for your existing bench.

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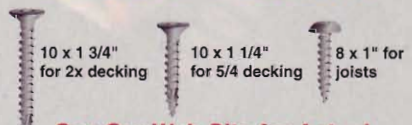

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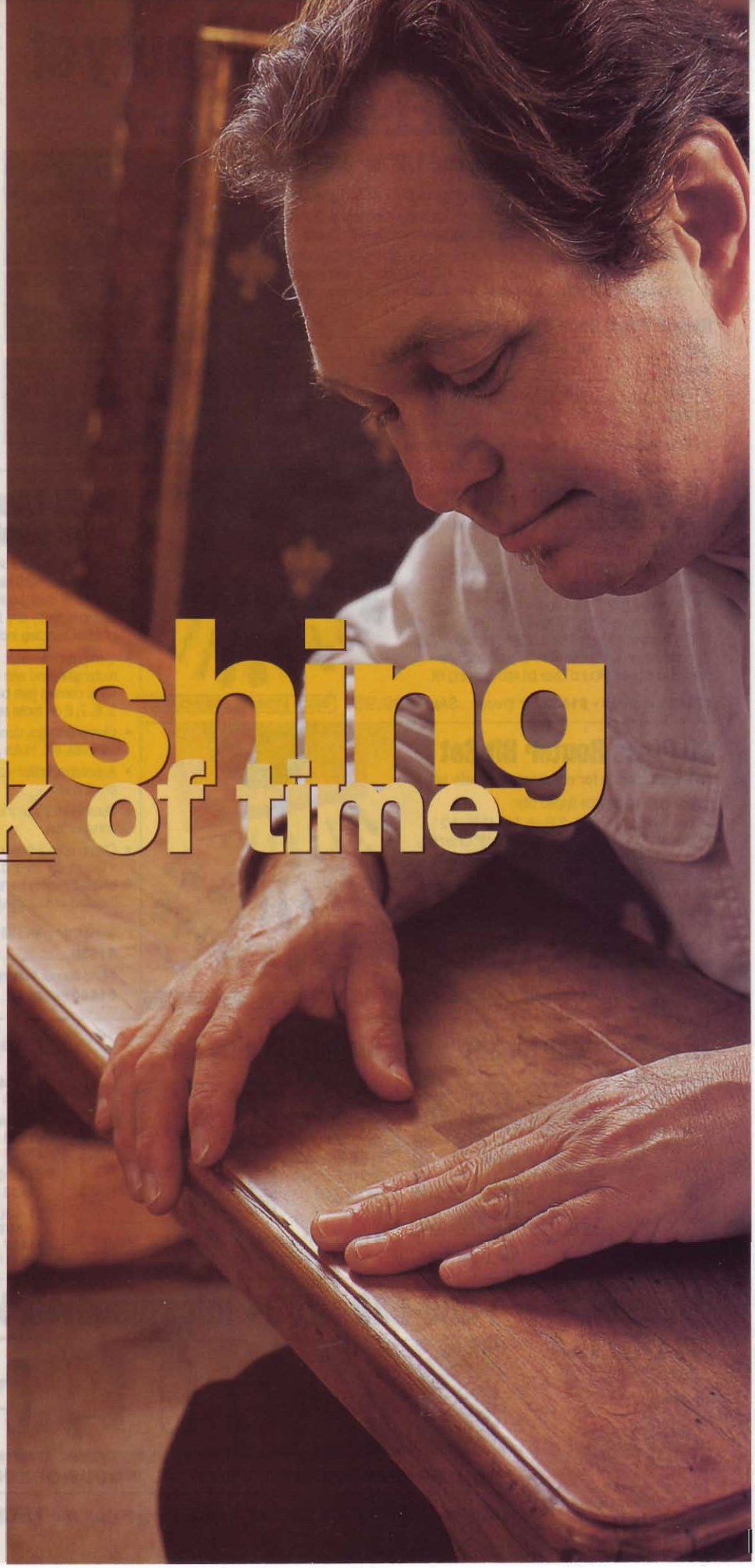
finishing with the nick of time

When you want furniture to look old, follow Greg Arceneaux's techniques



Around Louisiana's Lake Pontchartrain, historic 18th-century homes are nearly as common as the moss-draped live-oak trees that usually grace their lawns. Sometimes, the furniture in those homes is equally as old. But for most Louisianans, and others elsewhere in the Deep South, purchasing original antiques for furnishings is financially out of the question. That's where Greg Arceneaux, pictured at *right.* comes in.

His line of Acadian- and Creole-style furniture reflects Louisiana's rich history. In his Covington, Louisiana, shop he recreates pieces from the past made from cypress, heart pine, cherry, pecan, and walnut. And they can look as old as the homes in which they frequently end up.

Attack the wood with natural details

To get the well-aged, well-used look, Greg has much to do on a piece before the finish goes on. "What I do is called 'distressing,' and to get it just right, it can't be overdone," he says.

"There are several types of details involved in the distressing I do," Greg goes on. "There's insect attack, for one. That usually means creating the look that powder post beetles leave behind."

To demonstrate, Greg picks up a sharp leather awl and approaches the newly completed, sanded table. Quickly, he jabs the awl into the wood several times, as shown *above right*. "The awl, or an ice pick, makes the exit holes that the beetles leave in wood," he says, pointing to the freshly made, meandering punctures. "You don't have to make them deep for them to show up in the finished piece."

Another type of insect can attack furniture, especially in the South. Greg explains: "The work of termites also shows up in old pieces. They get into any wood that was left in a damp condition. And a lot of early furniture spent time in barns, in chicken coops, or on porches, so sometimes you see that kind of character mark. It's not unusual."

To make termite marks, Greg twists a small piece of wire into a soft spiral. Then, grabbing a hammer, he pounds the wire into the tabletop. "That makes the tunnel indentation," he says. "The awl will make the exit hole." Stab. "Now I've got a termite tunnel.

"Wood also shrinks and swells constantly. You can't stop it," Greg goes on. "So basically, I try to limit evidence of checking to where it normally would occur, such as on the end of the wood and into the flat grain. Wherever you see the cathedral patterns characteristic of flat-

With an awl, a chisel, and hammer, Greg inflicts the marks of 100 years on a new cypress table.

sawn wood, that's where I scratch in check marks with the awl. On the ends of the piece, I scribe a little deeper because cracks would be deeper there."

Imitate decades of wear and tear

Of course, furniture of age shows wear, too. And Greg doesn't neglect this aspect of distressing. In fact, he's perfected it.

"This type of detailing I do with a chisel first, and then a hammer," he notes. With a chisel in hand he once again approaches the tabletop. "See this nicely profiled edge here? Well, it wouldn't look like that after 100 years." Laying the chisel against the edge, he shaves off a thin ribbon. "That's where someone banged it with a serving tray," he chuckles, then moves on around the table judiciously peeling off a little wood here and there.

"Now, I'll start in with the hammer," he adds. "But I won't use the part that you'd normally hit with. Instead, I use the edge of the cast head to create a dent detail." Whack. Whack. Whack. Greg hits the wood in randomly selected spots, even on the legs. But he pays special attention to the shaved areas he created earlier with the chisel.

"Part of the trick in providing really authentic-looking distressing is to develop a layered effect," he advises. "It has to look as if it happened over the years. So where I created a worn detail—like an edge that I shaved with a chisel—I need to come back and bang it with a hammer afterward, like it got nicked years later. You also must look underneath at natural wear points, such as on the seat of a bench, and soften some of the machined edges. With age, everything gets softer and smoother. It's okay to leave some sharp, machined edges, but they have to be in areas where the piece would normally have been protected."

Backed by a wall of templates, finisher Timbo Chunkaew applies a coat of Danish oil to a walnut Creole table.

Add stain to accent the character marks

For staining, Greg relies on water-soluble aniline dye, mixed from different colors, depending on the desired look of the piece. "But for our 'Tidewater' finish, which has more of a tan cast, we put on Minwax Special Walnut, a pigmented oil-based stain," Greg points out. "But no matter what stain we use, it never goes directly on raw wood. For more control with the penetration, we first put on a straight coat of Deft Danish Oil finish and let it dry. Sealing means that, for one thing, cypress won't get blotchy."

With hardwoods, it's a slightly different story. "After the final sanding with 220 grit, we go over the piece with a damp cloth," Greg says. "That raises the grain. Then we sand it and seal it with oil before staining."

According to Greg, the stain accents the carefully applied distressing details, especially after the oil finish is applied. But there's an added touch. "On some pieces, like a dining chair or a table, I like to go around the feet and lower legs with a darker color of stain," says the craftsman. " When it's done, it looks like an old piece that had a mop slosh water on it, or maybe it had been sitting on the dirt floor of a barn and absorbed some mud."

Oil gets the nod for consistency

"I used to brew my own finishes, but that's time consuming," Greg comments. "I discovered Deft Danish Oil after experimenting with lots of others. It is the closest to the one I brewed, and it held up better than the others. It's also consistent, easy to apply, and dries fairly quickly. And the polyurethane resin with tung oil that are its main components make it quite durable."

In the finishing room, Greg's employees put on from three to five coats of the oil, wiping off the excess, letting it dry, then steel-wooling between coats as needed. "On pieces that aren't distressed, we top off the oil with a coat of Treewax, a carnauba-based product that's applied with #0000 steel wool, then buffed. For distressed pieces, we use Minwax Special paste wax because it accents the details," he notes. "Both give the wood a satiny feel."

Written by **Peter J. Stephano**
Photographs: **Michael Toranova**

Watch for more of Greg Arceneaux's work

See more of Greg's Louisiana furniture in the July/August 2001 issue of *WOOD*.

The Handcrafted Home

arching splen garden footbridge

Span the gap between ho-hum and spectacular land

dor

scaping

Bridges are among the most spectacular and admired examples of mankind's desire to build. This span will turn your landscape into an object of admiration, even if you don't have a body of water to cross. Just create a dry-stream setting for your structure by laying down a bed of rounded pebbles as we did. If that sounds like making an excuse to build a bridge, you're right. But the more you look at this bridge, the more you'll search for a reason to build it, too.

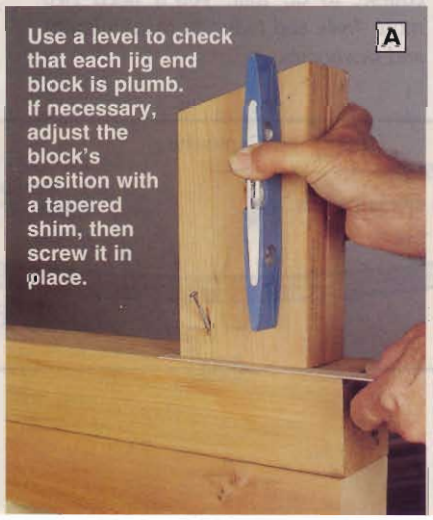
Our design features arched construction for appearance and strength. Go ahead and load it up—this beautiful brute won't flex a bit. Copper spindles (made from common ¾" plumbing pipe) and copper post tops complement the cedar components perfectly.

Build the laminating jig

1 Begin assembling the laminating jig by placing two sturdy sawhorses parallel and about 7' apart. On top of the sawhorses, stack two 10'-long 4×4 cedar posts. (You'll cut these later to make the bridge posts.) Level the 4×4s, both end-to-end and side-to-side. Also make sure that the edges of the posts are plumb. If necessary, use shims under the legs of the sawhorses to fine-tune the position of the posts.

2 Referring to the Beam-Lamination Jig drawing, make two sets of the jig end blocks. We made ours by gluing and screwing together two thicknesses of 2×6 stock, then marking and bandsawing the angle along the top end.

3 Mark the centerline on the edge of the 4×4 posts, where shown. Measure and mark the location of the jig end blocks, then set them in place. Use a level to make sure that each jig end block is plumb, as shown in **Photo A**. Secure the jig end blocks to the top 4×4 with 4" deck screws driven through angled pilot holes.



A

Use a level to check that each jig end block is plumb. If necessary, adjust the block's position with a tapered shim, then screw it in place.

Let's laminate the beams

1 We made each of the beams (A) from five pieces of 5/4×6 cedar boards 10' long. (This lumber actually measures 1 1/16" thick×5 3/8" wide.) Stack these boards face-to-face with their ends flush, and measure and mark the midpoint along their length. Use a pencil and framing square to draw a centerline across the edge of the stack.

2 Put one board on the laminating jig, and spread glue on its upper face. We poured weatherproof glue (Franklin Titebond II is one brand) into a paint tray and applied it with a 3" paint roller. Stack a second board face to face atop the first, and align their ends, edges, and the centerline marks. Use a pipe clamp to pull the pair of boards down into the jig so the boards' centerlines align with the jig's centerline. Make certain that the edges are still aligned, then add a second pipe clamp at the centerline on the opposite side of the boards.

3 Working quickly, clamp the arched boards together along their length. Begin at the center of the lamination and work toward each end. Always place one clamp opposing another on each side of the stack to keep it stable.

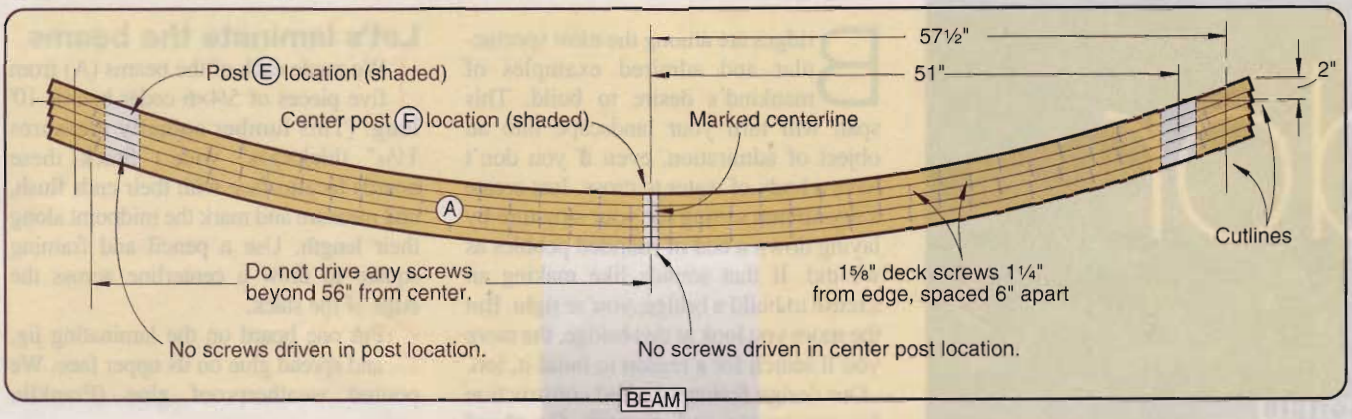
4 Secure the two boards together by driving a double row of 1 5/8" deck screws along their length. Space these screws 1¼" from each edge and about 6" apart. Be certain that each screwhead is slightly countersunk so it doesn't interfere with the positioning of the next lamination. Referring to the Beam drawing on the *next page*, do not drive screws into areas that will be cut away later or into the

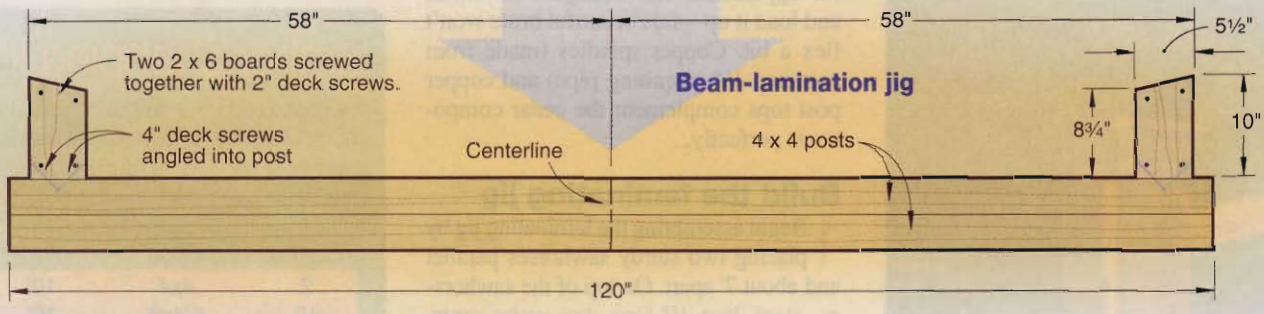
lumber shopping list

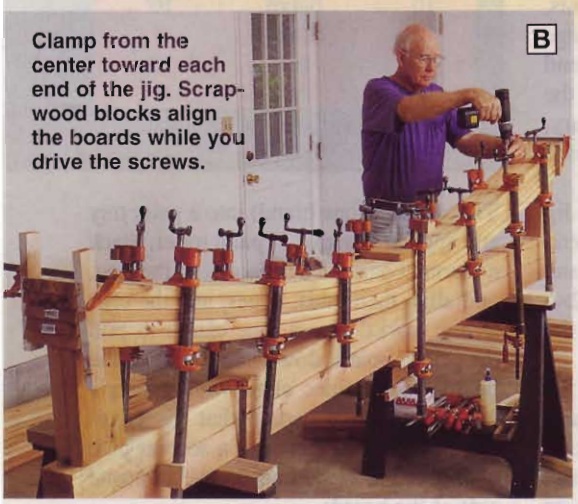
We chose cedar for its good looks, but you could use pressure-treated lumber for lower cost and greater durability. Either way, you'll need the following boards:

Quantity	Stock	Length
2	4x4	10'
10	5/4x6	10'
12	5/4x6	8'
16	1x4	10'
1	2x4	8'

Note: You'll also need a few woodscraps, including four 2×6 pieces at least 10" long







Clamp from the center toward each end of the jig. Scrapwood blocks align the boards while you drive the screws.

future attachment points for the end and center posts (E, F). Allow this assembly to dry for at least eight hours, then remove the clamps.

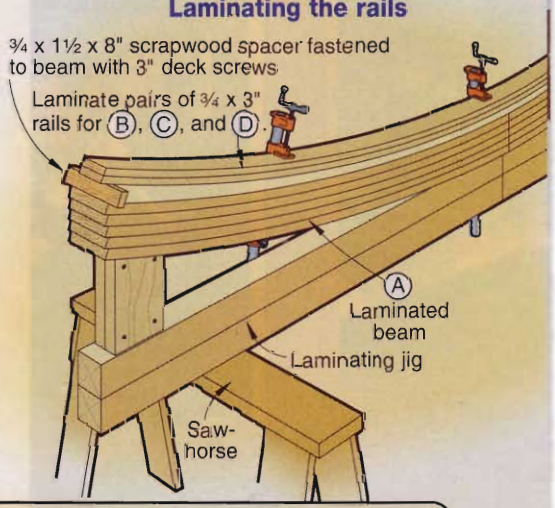
5 When you remove the center clamp, the lamination will spring up a few inches. Spread glue, and align the third board of the lamination. Following the procedure you used earlier, clamp the midpoint of the assembly, carefully aligning the centerlines and edges. Referring to **Photo B**, clamping scrapwood blocks vertically near the ends of the boards helps keep their edges aligned. Add more clamps along the length of the lamination, drive the screws, and let the assembly dry. Repeat this process to add the fourth and fifth boards to the beam lamination. Then repeat the entire sequence to make the second beam.

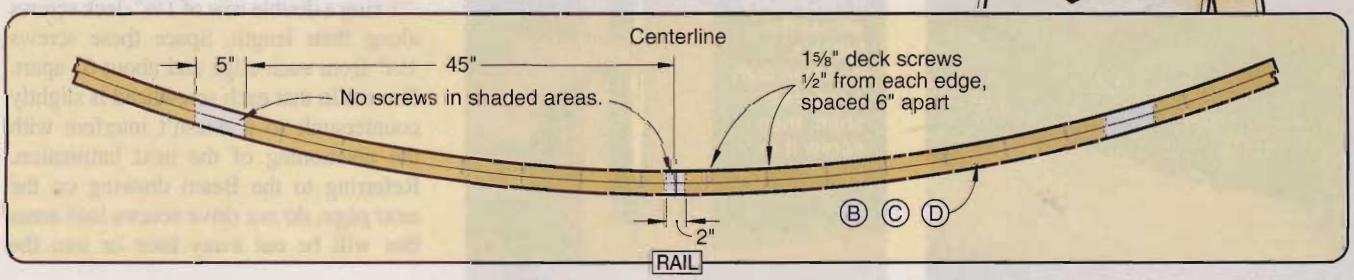
Note: To speed this process, you can laminate both beams at once. Of course, to do that, you'll need two more 4x4s and twice as many clamps and sawhorses.

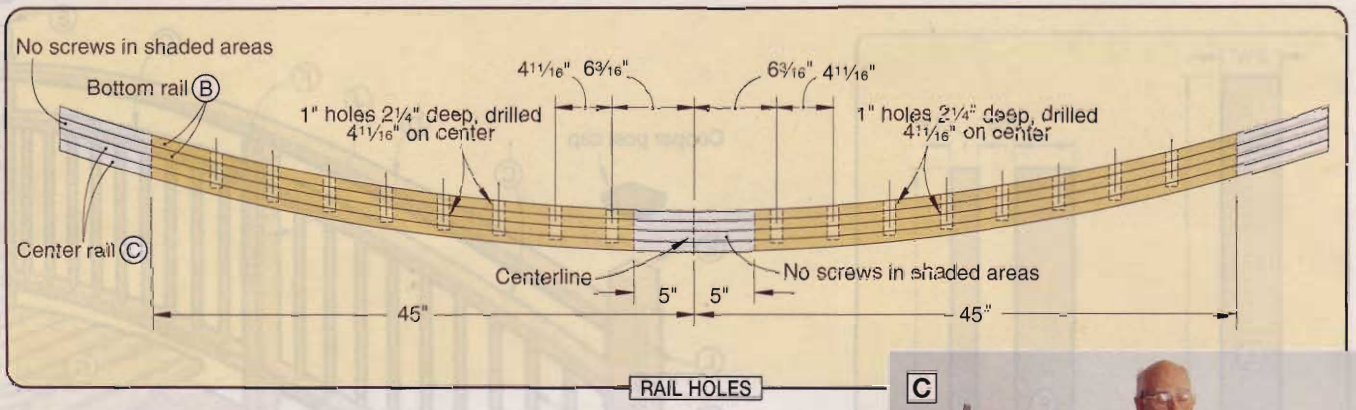
Laminate the rails

1 Rip twelve 10'-long cedar 1x4s to 3" wide to make the bottom rails (B), the center rail (C), and the handrails (D).

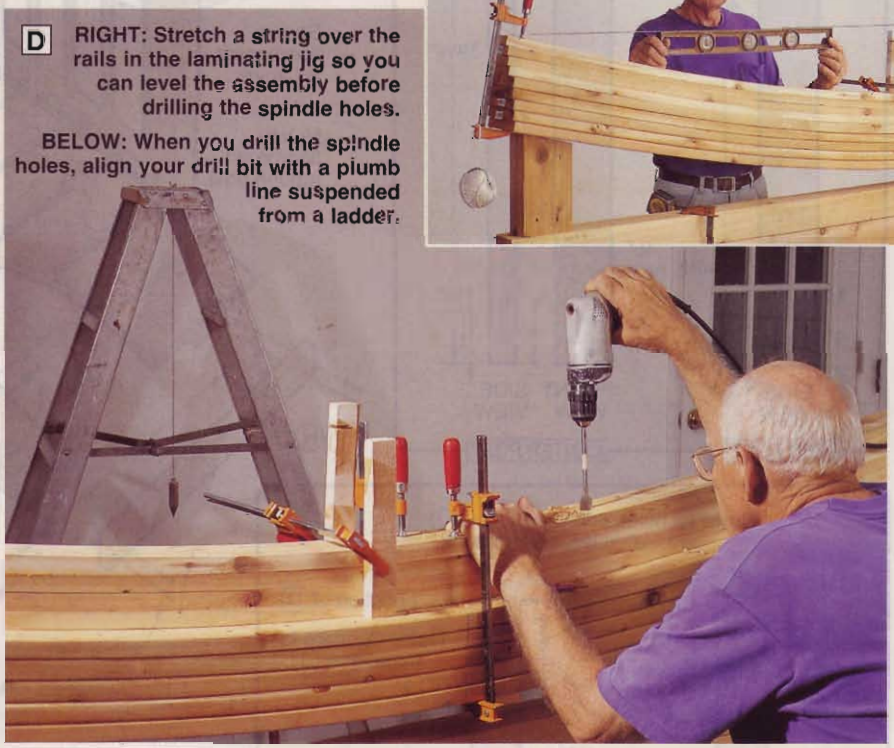
Laminating the rails


¾ x 1½ x 8" scrapwood spacer fastened to beam with 3" deck screws
Laminate pairs of ¾ x 3" rails for (B), (C), and (D).
A
Laminated beam
Laminating jig
Saw-horse





C



D **RIGHT: Stretch a string over the rails in the laminating jig so you can level the assembly before drilling the spindle holes.**

BELOW: When you drill the spindle holes, align your drill bit with a plumb line suspended from a ladder.

Note: Each 10'-long lamination will yield two bottom rails (B) or center rails (C) that you'll cut to length later. (To get two crisp edges, we used a tablesaw to rip ¼" off one edge of each board, then reset the fence to trim the board to 3" wide.)

2 Stack up the rail stock with the ends and edges flush. Measure the midpoint of the stock's length, then pencil a centerline on the boards' edges.

3 Leave the second completed beam in the laminating jig. Referring to the Laminating the Rails drawing, screw a temporary ¾×1½×8" scrapwood spacer near each end of the beam. This spacer initially makes the rail more curved than the beam, but when you remove the clamps after glue-up, the laminated rail will spring back to the approximate shape of the beam.

4 Lay one piece of rail stock on the beam with the ends resting on the scrapwood blocks. Spread glue on the rail stock, then place another piece of rail stock atop it. Align the centerlines of the rail stock with the beam's centerline, and clamp in place. Use additional clamps to laminate the two pieces of rail stock tightly together.

5 Referring to the Rail drawing, secure the two boards together by driving a double row of 1⅝" deck screws along their length. Space these screws ½" from each edge and about 6" apart. The drawing shows shaded areas where you cannot leave screws. However, you may need to drive screws into these areas until the lamination dries; then remove them. Allow the assembly to dry for eight hours, then repeat the process for the remaining five pairs of rail stock. After you unclamp the last rail lamination, unscrew the scrapwood spacers from the beam (A).

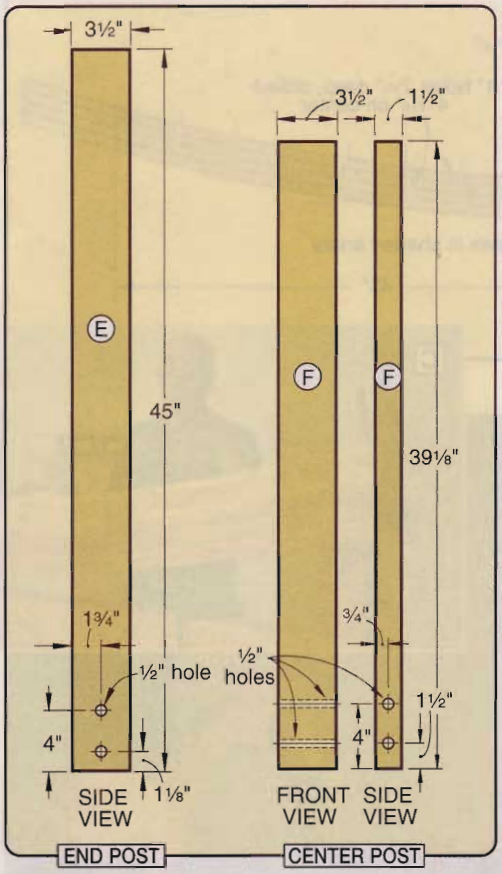
Drill the rails

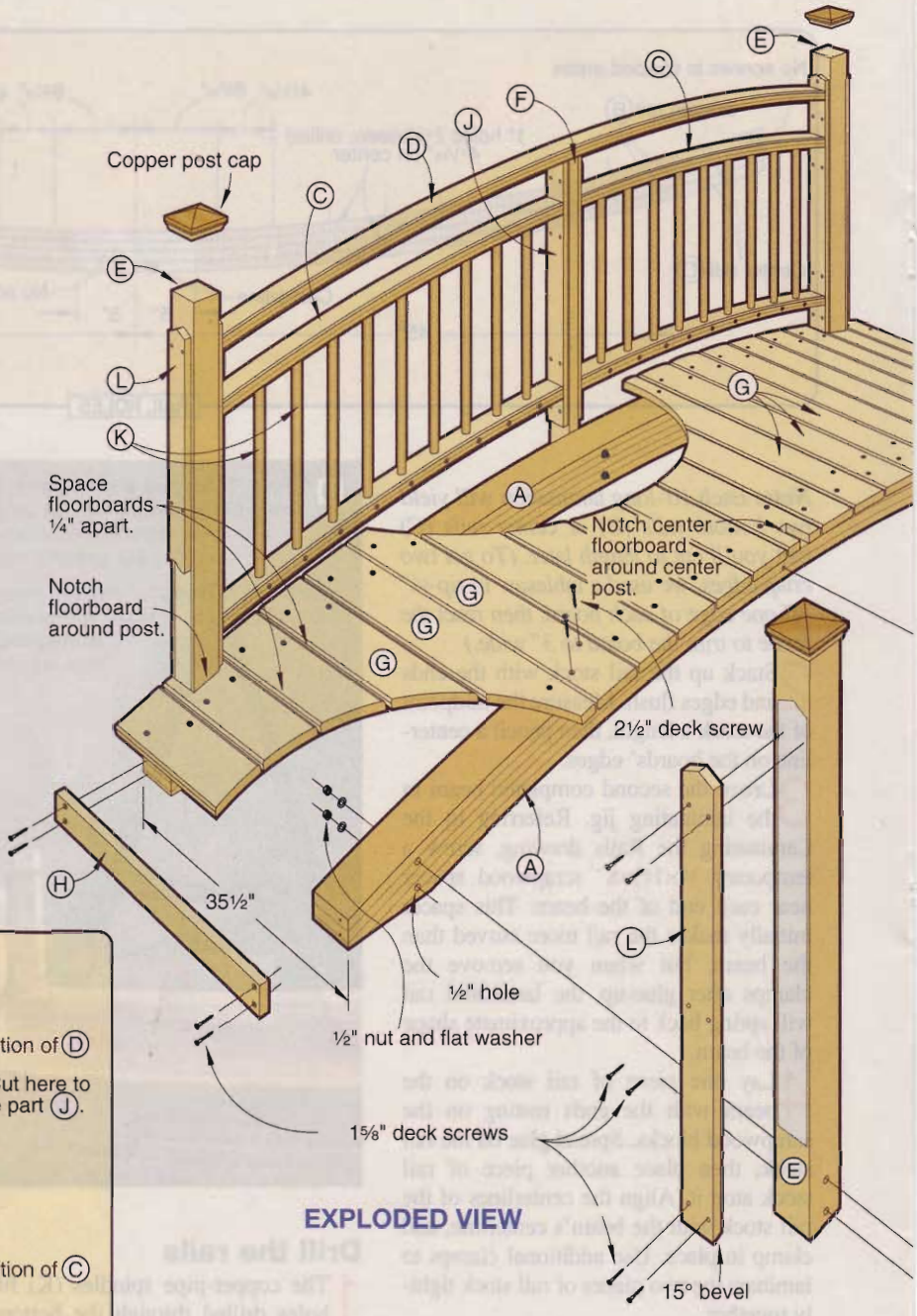
1 The copper-pipe spindles (K) fit into holes drilled through the bottom rail (B) and partially into the center rail (C). To drill these holes, you'll stack and clamp these rails inside the curve of the beam (A) with all of the centerlines aligned. But before you drill, you'll need to level the setup.

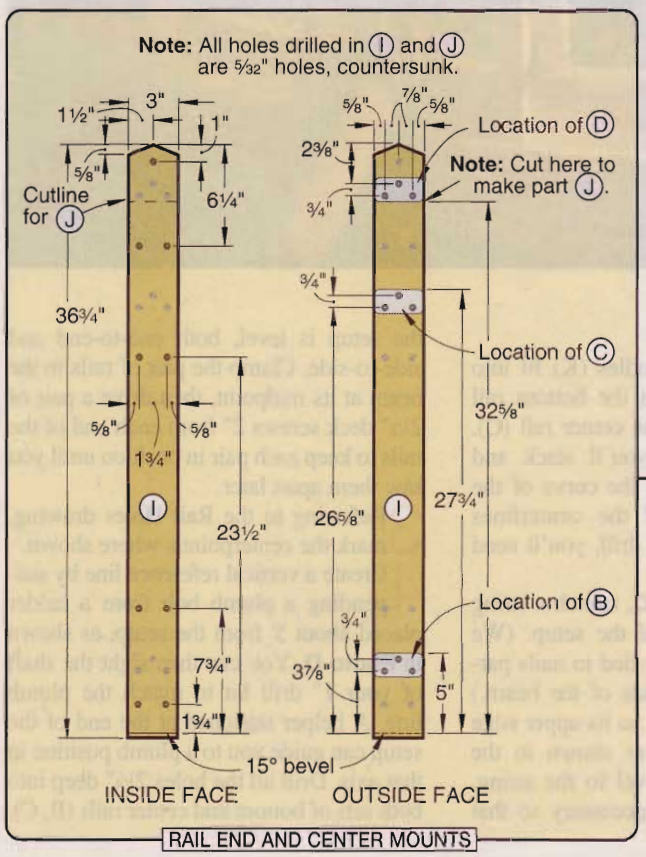
2 Referring to **Photo C**, stretch a string between the ends of the setup. (We used nylon mason's line tied to nails partially driven into the ends of the beam.) You can hold your level so its upper edge just grazes the string, as shown in the photo, or clip a line level to the string. Make any adjustments necessary so that the setup is level, both end-to-end and side-to-side. Clamp the pair of rails to the beam at its midpoint, then drive a pair of 2½" deck screws 2" from each end of the rails to keep each pair in position until you saw them apart later.

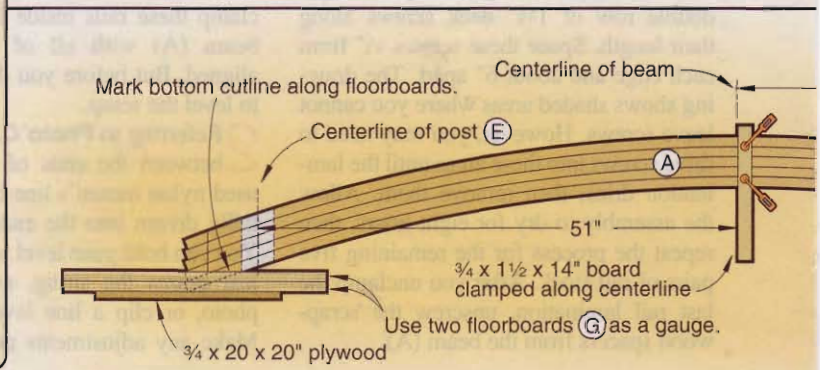
3 Referring to the Rail Holes drawing, mark the centerpoints, where shown.

4 Create a vertical reference line by suspending a plumb bob from a ladder placed about 5' from the setup, as shown in **Photo D**. You can then sight the shaft of your 1" drill bit to match the plumb line. A helper stationed at the end of the setup can guide you to a plumb position in that axis. Drill all the holes 2¼" deep into both sets of bottom and center rails (B, C).


3½"
E
45"
1¾"
½" hole
4"
1⅛"
SIDE VIEW
END POST
3½"
1½"
F
F
39⅛"
¾"
½" holes
1½"
4"
FRONT VIEW
SIDE VIEW
CENTER POST


Copper post cap
E
C
F
J
D
L
K
G
A
Space floorboards ¼" apart.
Notch floorboard around post.
Notch center floorboard around center post.
2½" deck screw
H
35½"
½" hole
½" nut and flat washer
1⅝" deck screws
15° bevel
EXPLODED VIEW


Note: All holes drilled in I and J are ⅝₃₂" holes, countersunk.
1½"
3"
1"
⅝"
Cutline for J
6¼"
36¾"
⅝"
⅝"
1¾"
I
23½"
1¾"
INSIDE FACE
⅝"
⅞"
⅝"
Location of D
2⅜"
Note: Cut here to make part J.
¾"
¾"
Location of C
32⅝"
26⅝"
I
27¾"
Location of B
¾"
3⅞"
5"
15° bevel
OUTSIDE FACE
RAIL END AND CENTER MOUNTS


Centerline of beam
Mark bottom cutline along floorboards.
Centerline of post E
A
51"
¾ x 1½ x 14" board clamped along centerline
Use two floorboards G as a gauge.
¾ x 20 x 20" plywood

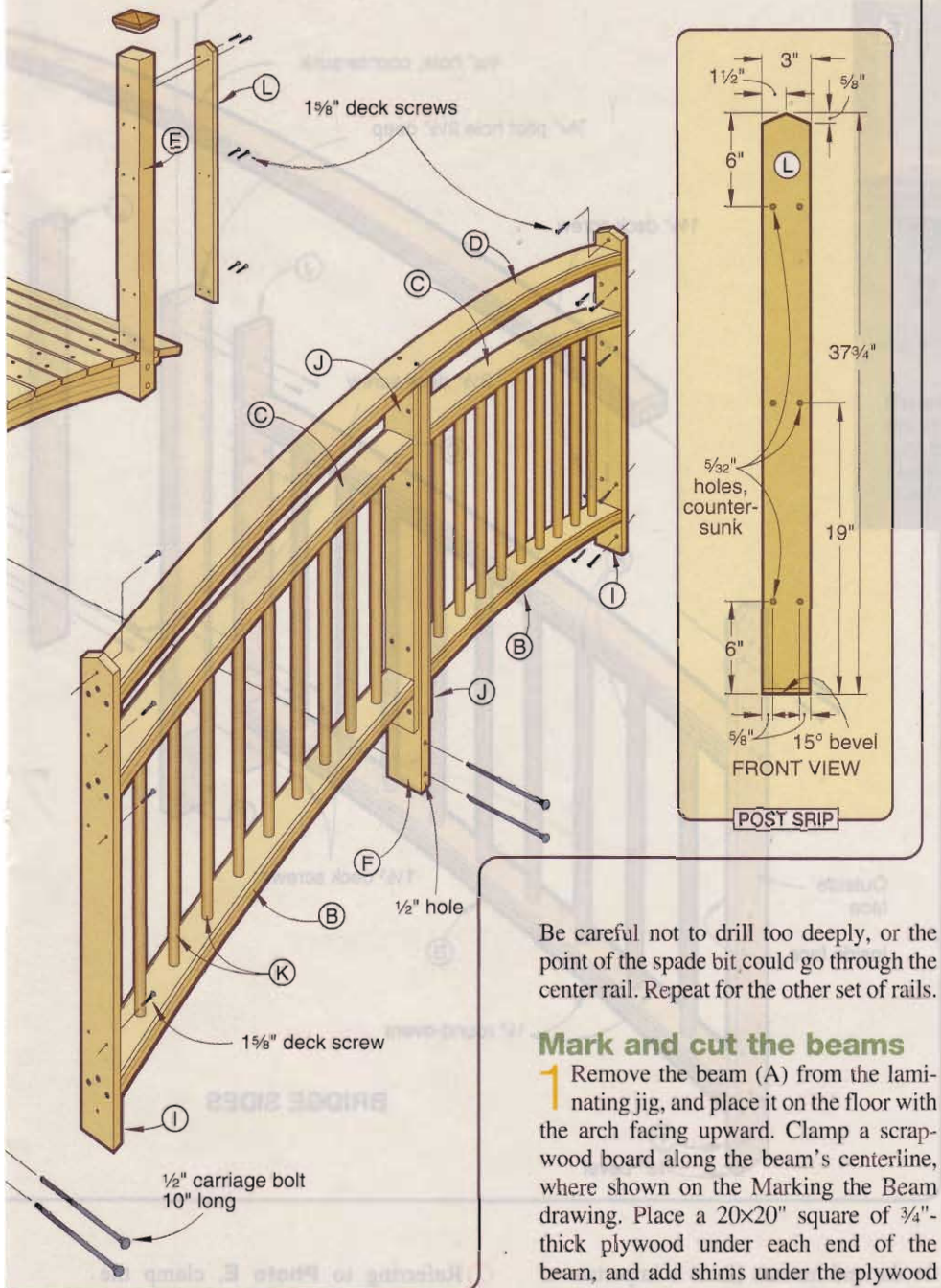
bill of materials

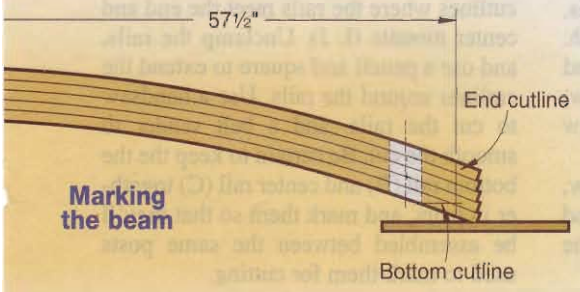
garden footbridge

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A	beams	5"	5⅜"	115"	LC	2
B	bottom rails	1½"	3"	47"	LC	4
C	center rails	1½"	3"	47"	LC	4
D	handrails	1½"	3"	97"	LC	2
E	end posts	3½"	3½"	45"	C	4
F	center posts	1½"	3½"	39⅛"	C	2
G	floorboards	1¹⁄₁₆"	5⅜"	42½"	C	21
H	end caps	1¹⁄₁₆"	3"	35½"	C	2
I	end mounts	¾"	3"	36¾"	C	4
J	center mounts	¾"	3"	32⅝"	C	4
K	spindles	¾"	dia	23½"	CP	36
L	post strips	¾"	3"	37¾"	C	4

Materials key: LC-laminated cedar; C-cedar; CP-copper pipe

Buying Guide: ½x10" carriage bolts with nuts and washers (12); #8x1 ⅝" deck screws (5 lbs.); #6x1¼" deck screws (3 lbs.); #8x2½" deck screws (2 lbs.); ¾"-dia. copper pipe 10' long (8); copper post tops (4), model VT-1, about $10 each, available at many home centers. If you have difficulty locating copper post caps, contact the manufacturer, Maine Ornamental Woodworkers, at 800/556-8449, ext. 13. Or, visit www.postcaps.com





Marking the beam

Be careful not to drill too deeply, or the point of the spade bit could go through the center rail. Repeat for the other set of rails.

Mark and cut the beams

1 Remove the beam (A) from the laminating jig, and place it on the floor with the arch facing upward. Clamp a scrapwood board along the beam's centerline, where shown on the Marking the Beam drawing. Place a 20x20" square of ¾"-thick plywood under each end of the beam, and add shims under the plywood as needed to get a plumb reading on a level held against the scrapwood board at the centerline.

2 Measuring from the centerline of the beam, make a mark at each end cutline. Use a pencil and framing square to complete these vertical lines. Use the same method to mark the location of the end posts (E) at each end of the beam.

3 Referring to the Marking the Beam drawing, use two thickness of the 5/4 cedar stock that you'll use for the floorboards (G) as a gauge to mark the horizontal cutlines.

4 Using a circular saw, cut just to the waste side of each of these cutlines. Then use each kerf as a guide for a handsaw to complete the cuts. Repeat the process for the other beam.

It's post time

1 Referring to the End Post and Center Post drawing, and using the 10' posts from the beam-lamination jig, cut the end posts (E) and the center posts (F) to length. Mark the holes, where shown on the drawing, and drill them. Mark centerlines along each post edge that will attach to the beam (A).

2 Put one of the beams on the plywood squares you used when you marked the cutlines on the beam, and adjust it with shims under the plywood so that the centerline is plumb. Clamp the end posts (E) and the center post (F) to the beam (A), aligning the centerlines of the posts with the centerlines marked on the beam. Check that each post is plumb, then use the holes in the posts as guides to drill into the beam. When your drill's chuck bottoms out against the post, unclamp the

Clamp the rail assemblies to the bridge's floor, and you can mark the cutlines easily and accurately.

post and finish drilling through the beam. Referring to the Exploded View drawing, bolt the posts to the beam. Repeat the process for the remaining posts and beam.

Add the bridge's floorboards

1 Referring to the Exploded View drawing, place the two beam assemblies parallel to each other with the outer edges of the beams 35½" apart. Using the plywood squares and shims, adjust both assemblies so that the posts are plumb. Temporarily screw scrapwood spacers between the two beam assemblies to keep them aligned while you prepare the floorboards (G).

2 Cut the floorboards (G) from 5/4×6 cedar to 42½" long. (Each floorboard extends 3½" past the edge of each beam.) Referring to the Exploded View drawing, notch the center floorboard to fit around the center posts (F), and fasten it to the beams with 2½" deck screws. Screw in the remaining floorboards, using scrapwood spacers to position them ¼" apart. Notch floorboards around the end posts (E), and screw them in place.

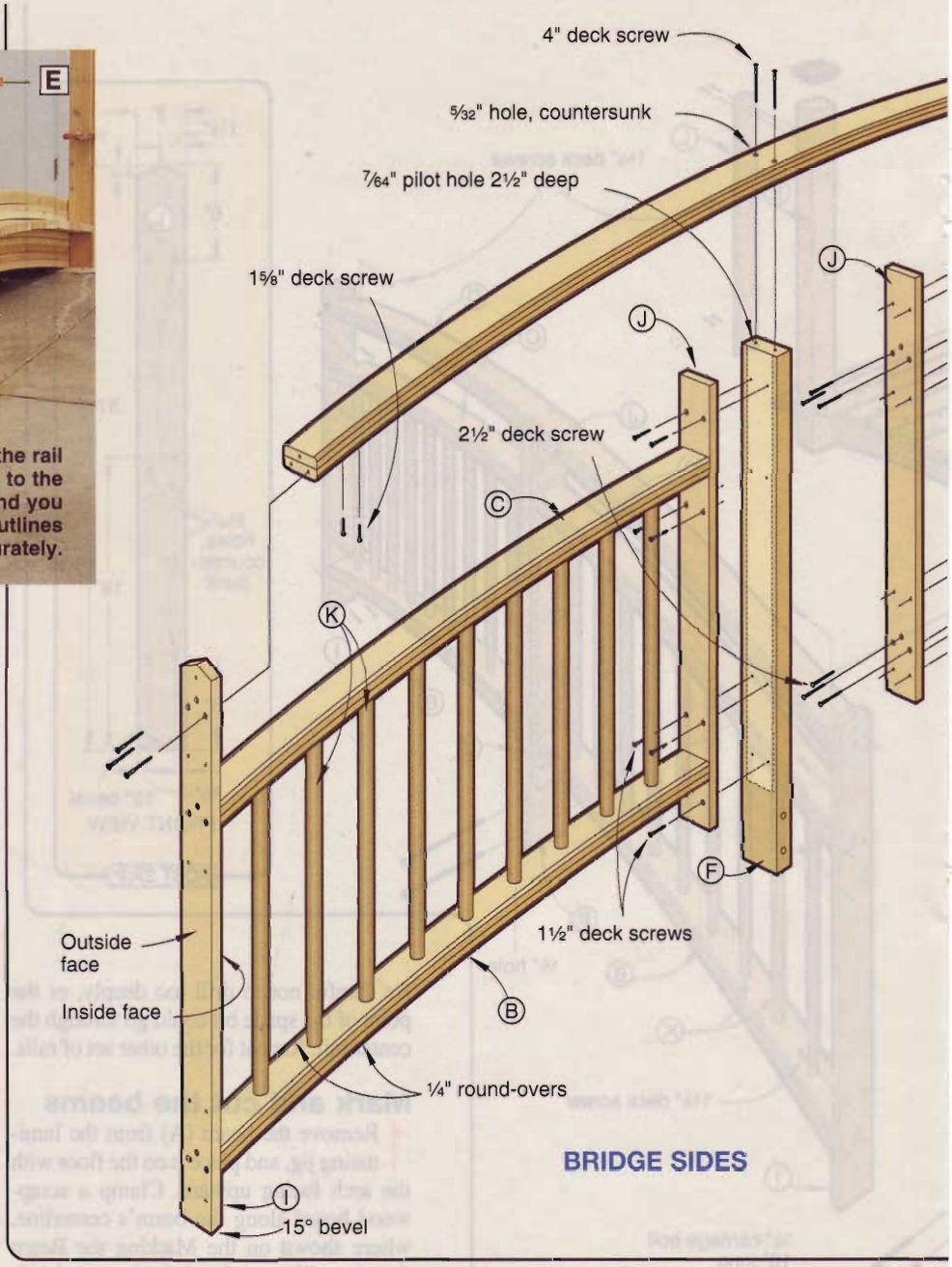
3 Rip and crosscut the end caps (H) to the size listed in the Bill of Materials, then attach them, where shown in the Exploded View drawing.

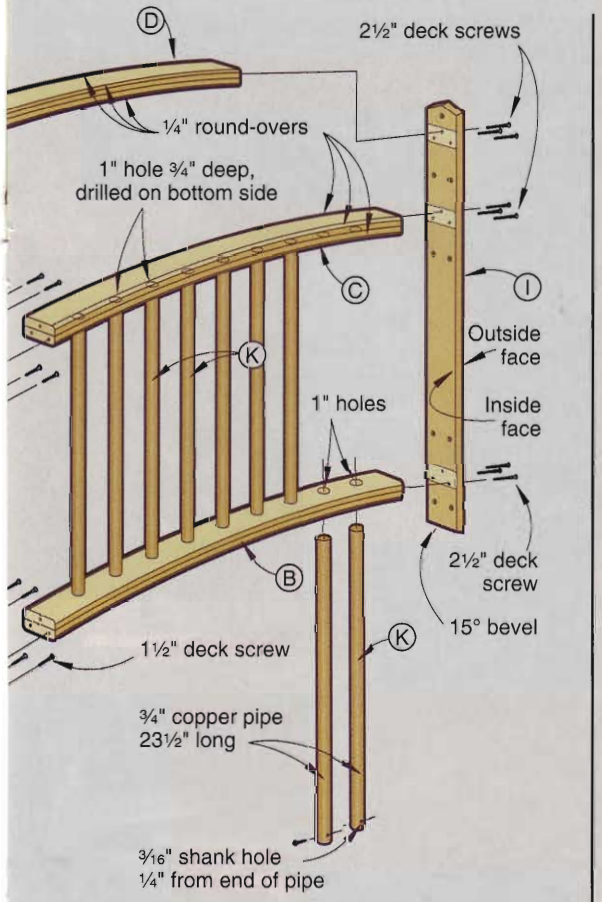
Make the mounts

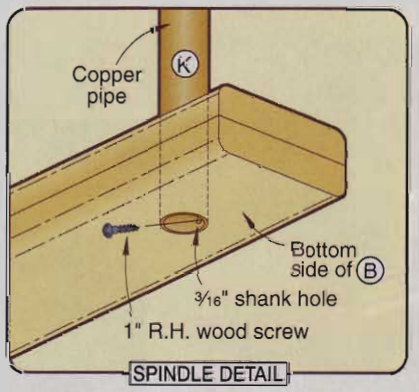
1 Referring to the Rail End and Center Mounts drawing, rip stock for the end mounts (I) and the center mounts (J). Cut a 15° bevel at the lower end of each blank for the end mounts (I). It is important to note that all measurements on the end mounts are indexed from the upper edge of this bevel. Mark and drill the holes, where shown, and cut the parts to length. Mark the shape at the top of the end mounts (I), and cut it with a bandsaw. Sand the cut, if necessary, to remove saw marks from the wood.

2 Referring to the Exploded View, clamp the end mounts (I) to the end posts (E) and the center mounts (J) to the center posts (F).

3 Referring to **Photo E**, clamp the bottom- and center-rail assembly (B, C) to the bridge's floorboards (G), and mark cutlines where the rails meet the end and center mounts (I, J). Unclamp the rails, and use a pencil and square to extend the cutlines around the rails. Use a handsaw to cut the rails, and a belt sander to smooth the cut. Be certain to keep the the bottom rail (B) and center rail (C) together in pairs, and mark them so that they'll be assembled between the same posts used to mark them for cutting.







4 Rout a ¼" round-over along all of the edges (but not the ends) of the bottom and center rails (B, C).

Build the side Assemblies

1 Unclamp the end mounts (I) and the center mounts (J). Referring to the Bridge Sides drawing, position a pair of bottom and center rails (B, C) between them. Position the rail ends to the marks you made earlier on the end and center mounts (I, J), and drive the 2½" screws to secure the assembly. Repeat this process for the remaining three assemblies.

2 Use a tubing cutter (purchased from the plumbing-supply section of a hardware store) to cut the spindles (K) to length from ¾" copper pipe. To remove the lettering from the spindles, wipe the copper with a cloth dampened with lacquer thinner. Referring to the Spindle Detail drawing, drill a hole through one wall of each spindle, near the end of the pipe as shown.

3 Insert the spindles through the bottom of the bottom rail (B) and into the center rail (C). Referring to the Spindle Detail drawing, fasten each spindle by driving a screw through the spindle into the bottom rail (B).

4 Position each side assembly into its opening to make certain that it fits properly. Clamp each assembly into place, but do not drive in any screws yet.

Fit and assemble the handrail

1 Referring to **Photo F**, clamp a pair of 8"-long scrapwood boards flush with the top of each center post (F). Place a handrail (D) on the scrapwood, aligning the handrail's centerline with the centerline of the center post. Aligning the handrail with the end marks you previously made on the end mounts (I), mark cutlines on the handrail.

2 Rout the round-over along the edges of the handrails (D), then cut these parts to length with a handsaw. Referring to **Photo G**, tilt the top of the side assemblies outward to provide clearance to drive the screws. Clamp the assemblies in this position while you drive the screws through the end mounts (I) into the handrail (D). Unclamp, plumb the end and center mounts (I, J), then drive screws through these parts into the posts. Referring to the Bridge Sides drawing, drill pilot holes for the 4" deck screws that attach the handrail (D) to the center post (F), then drive these fasteners. Repeat the fitting and assembly steps for the other handrail.

Finishing touches

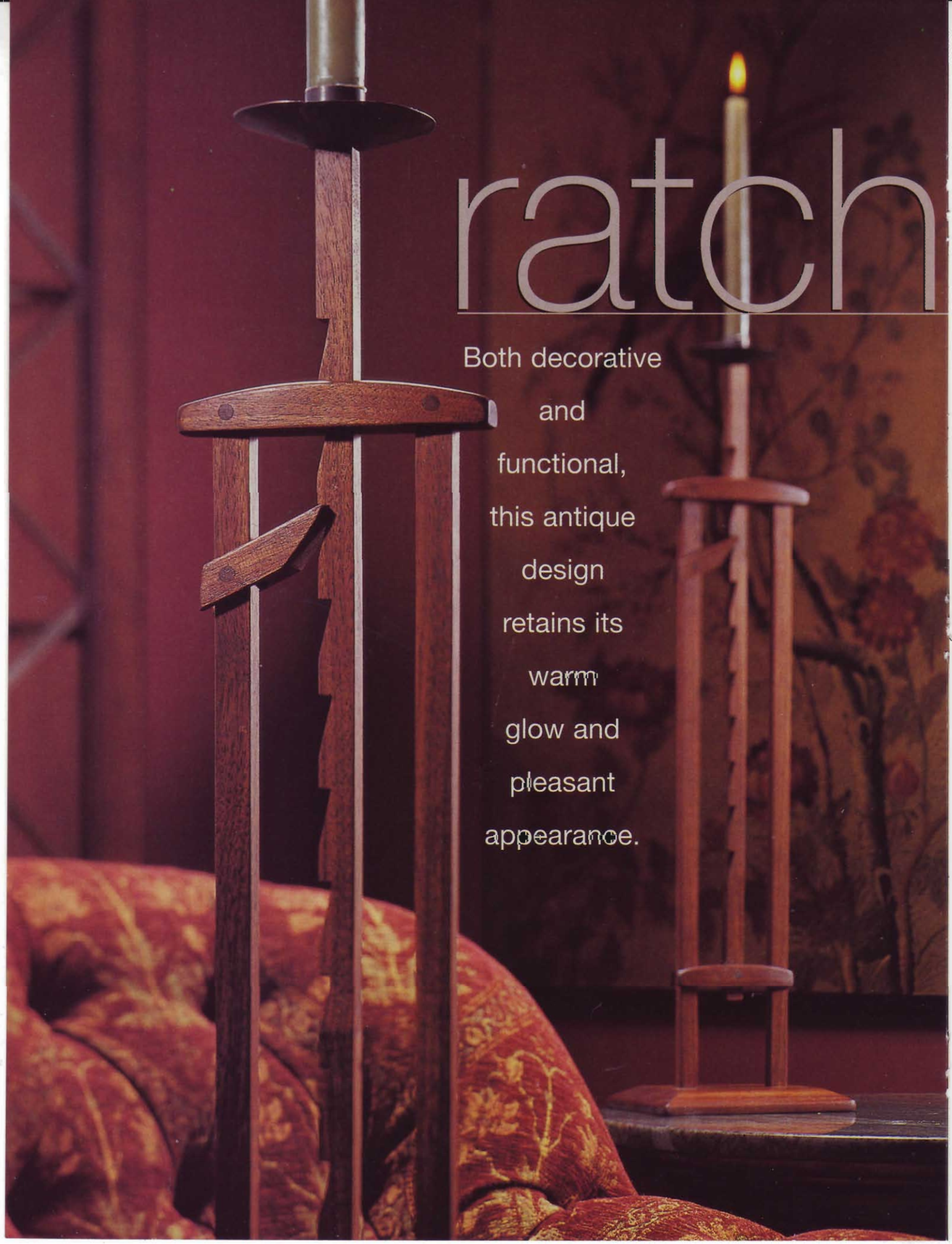
1 Referring to the Post Strip drawing, cut the post strips (L) to size, then drill the holes. Note that these parts have a 15° bevel cut along the bottom end. Screw the post strips to the end posts (E).

2 Apply your choice of finish to the bridge. We used two coats of clear Flood CWF.

3 Use exterior-grade caulk to secure the copper post caps to the top of each end post (E). See the Buying Guide section of the Bill of Materials for our source for these caps.

4 We installed the bridge by setting each beam end on a 2×12×12" precast concrete patio paving block. Before setting the bridge, we used a level atop a *straight* 10'-long 2×4 to level all the blocks to each other. Take your time with this step—the bridge will be there to enjoy for a long time to come.

Produced by **Robert J. Settich, Erv Roberts** and **Bill Krier**
Project Design: **James R. Downing**
Illustrations: **Kim Downing; Lorna Johnson**
Photographs: **Baldwin Photography**


ratch
Both decorative
and
functional,
this antique
design
retains its
warm
glow and
pleasant
appearance.

Great American HEIRLOOMS™

eting candlestand

Back when candles were relied on for nighttime illumination, a stand like this one proved indispensable. With it, the user would keep a candle flame at a consistent height for reading by ratcheting the candle up one notch at a time.

Today, the stylish good looks of these quaint candlestands help them light up your home's interior, even when a candle's not burning. You can build one or more of these beauties in a weekend, and learn a couple of nifty tricks about working with copper in the process.

***Note:** The original ratcheting candlestand upon which we based our design (see boxed information* below*), was made of cypress that had acquired a dark patina over the years. We chose to build the candlestands shown here from walnut.*

First, make the base

1 Cut a ¾×5½×7" walnut blank for the base (A).

2 Set your tablesaw blade at a 25° angle, and position the fence so the blade tilts away from the fence. Set the fence ⅜" from the point where the blade comes through the tablesaw top. Stand the base on end and bevel one end, then the other end, then both edges.

3 Remove any saw-blade marks with a progression of sandpaper grits. Lightly sand the corners of the base round, as shown on the Base drawing.

4 Mark the position of two 5/32" holes on the bottom (unbeveled) face of the base, where shown on the Base drawing. Drill the holes and countersink them on the bottom face.

These bolsters will help give your stand a lift

1 Cut one ¾×1½×5¼" blank for the upper bolster (B), and one ¾×1½ ×4¼" blank for the lower bolster (C).

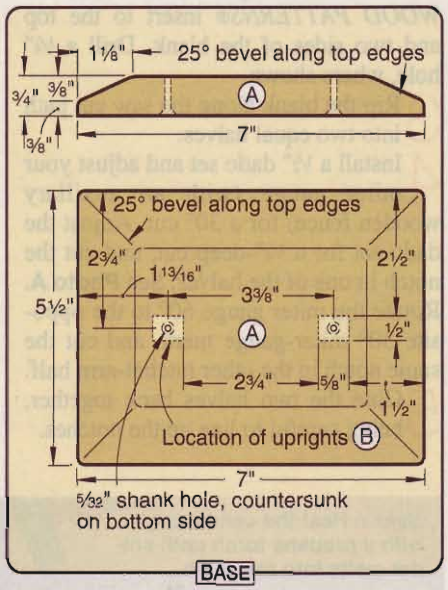
2 Make copies of the full-size Top View and Side View Patterns in the *WOOD PATTERNS*® insert for both bolsters, and apply with spray adhesive.

3 Drill ¼" holes through each bolster, where shown on the patterns.

4 Rip each blank down the center into two equal halves.

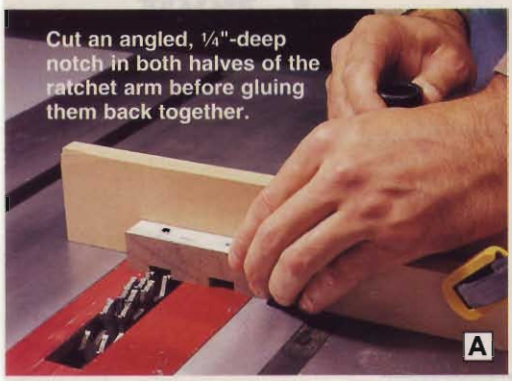
5 Outfit your miter gauge with an auxiliary wooden fence that extends past your tablesaw's blade by at least 3". Replace the blade with a ⅝" dado set. Adjust the dado set for a ¼"-deep cut, and cut all of the mortise dadoes on each half, except for the middle mortise on the upper bolster (B). Readjust the dado set for a 9/32"-deep cut, and dado the middle mortise on part B.

***Note:** Use the pattern locations as a guide for locating the dadoes, but double-check*



Our design is based on an antebellum original

While on a project-scouting mission in the Tampa/St. Petersburg area, we came across the original version of this stand in the mansion of the Gamble Plantation in Ellenton, Florida. Once the location of a 3,500-acre sugar-cane operation, the 16-acre state historic site today offers an insight into mid-1800s life through a walking tour of the only antebellum plantation house surviving in south Florida. The Gamble Plantation is open 8 a.m.–5 p.m., Thursday through Monday except Thanksgiving, Christmas, and New Year's day. It is located on U.S. 301, one mile west of I-75. Call 941/723-4536, or visit www.dep.state.fl.us/parks



their exact locations by measuring and marking according to the dimensions shown on the full-size patterns.

6 Glue the two halves of the blanks together, being careful to precisely line up the dadoes. Cut the top profile, and reattach the cut-off scrap with double-faced tape. Cut the side profile. Soften the corners with sandpaper.

Next up, the ratchet arm

1 From resawn or planed ⅝" stock, cut a 1⅛×6" blank for the ratchet arm (D).

2 Copy, fold, and adhere the full-size Ratchet Arm pattern found in the *WOOD PATTERNS*® insert to the top and two sides of the blank. Drill a ¼" hole, where shown.

3 Rip the blank along the saw cut path into two equal halves.

4 Install a ½" dado set and adjust your miter gauge (with an auxiliary wooden fence) for a 30° cut. Adjust the dado set for a ¼"-deep cut, and cut the notch in one of the halves. See **Photo A**. Rotate the miter gauge 60° to the opposite 30° miter-gauge mark, and cut the same notch in the other ratchet-arm half.

5 Glue the two halves back together, being careful to line up the notches.

6 Cut the end of the blank at a 30° angle. Scrollsaw the other end according to the pattern lines on the sides of the blank. Sand away all saw marks.

Now, shape the ratchet

1 Cut a ½×⅝×21¼" walnut blank for the ratchet (E).

2 With a scrollsaw cut the notches shown on the Ratchet Detail. Drill the ¼" hole, where shown.

3 Sand ⅛" round-overs on the bottom of the ratchet, as shown.

4 Attach the lower bolster to the ratchet with a glued ¼" walnut dowel 1¼" long, as shown on the Exploded View.

Onward to the uprights

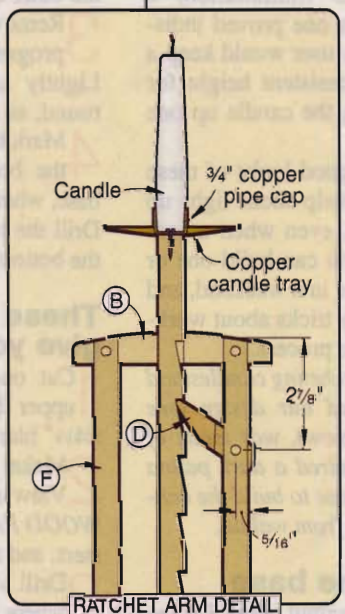
1 Cut two ½×⅝×20¼" blanks for the uprights (F).

2 Drill the lower ¼" hole in one of the uprights, where shown on the Ratchet Arm Detail.

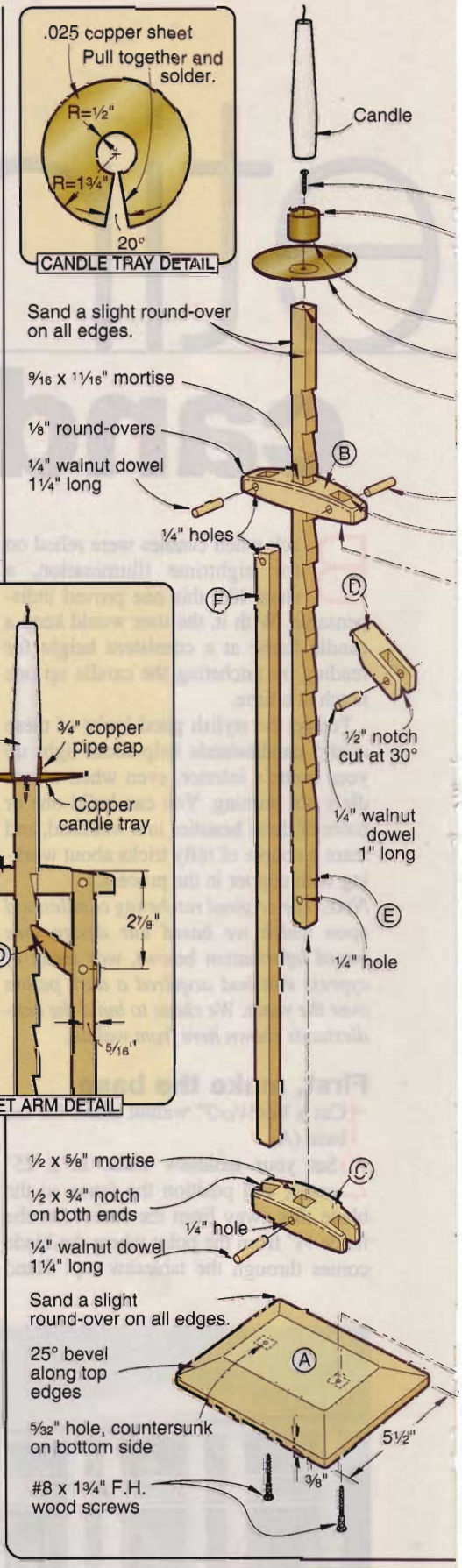
3 Slightly file the notched surfaces of the ratchet arm (D) so it will pivot freely on the upright you just drilled. Apply glue to the ¼" holes in the ratchet arm, and attach it to the upright using a ¼×1" walnut dowel.

Note: *The dowel must rotate freely in the upright. To keep glue off the hole in the upright and to help the ratchet pivot freely, rub paraffin wax inside of the hole in the upright.*

4 Fit the uprights into the mortises in the upper bolster (B) so the top edges of the uprights protrude just slightly—about 1/32"—above the tops of the mortises.

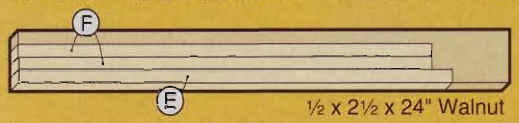


Below: Heat the candle tray with a propane torch until solder melts into the seam.
Right: Center a ¾" copper pipe cap on the candle tray and solder it into place. Concentrate the heat inside the cap.
B
C

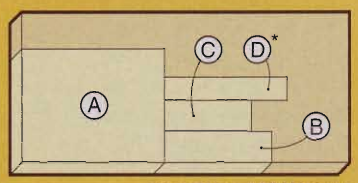


cutting diagram

*Plane or resaw to thickness listed in the Bill of Materials.



½ x 2½ x 24" Walnut



¾ x 7¼ x 16" Walnut

bill of materials

ratcheting candlestand

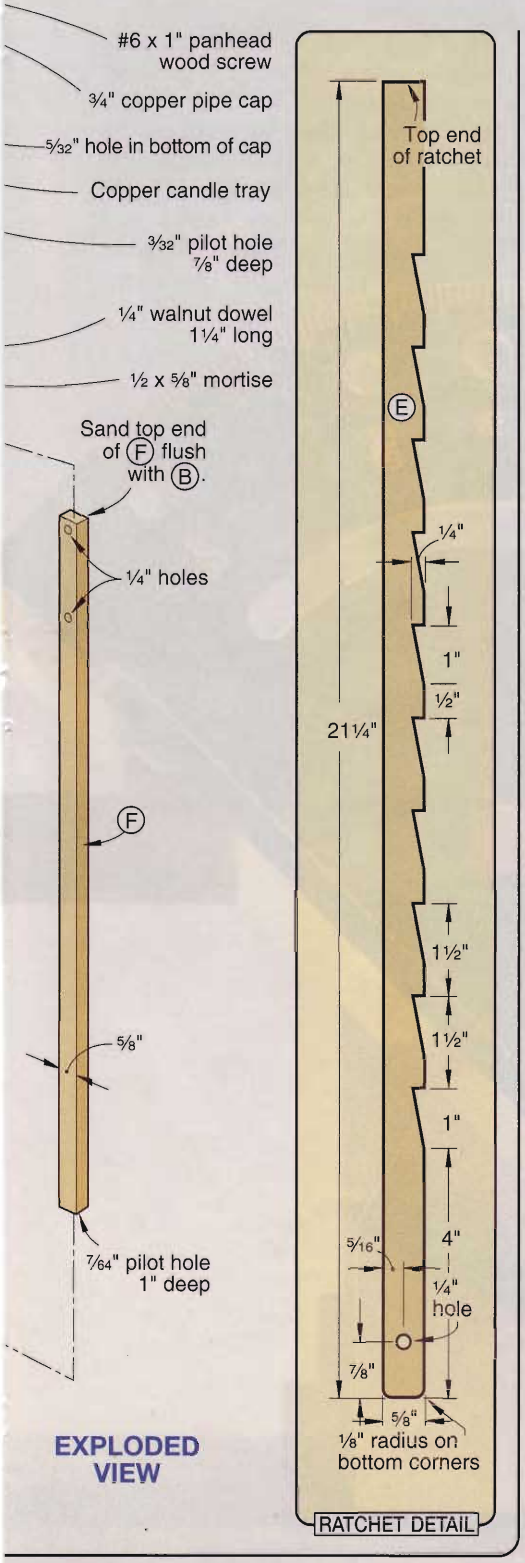
Part	FINISHED SIZE T	W	L	Matl.	Qty.
A base	¾"	5½"	7"	W	1
B* upper bolster	¾"	1¼"	5¼"	W	1
C* lower bolster	¾"	1¼"	4¼"	W	1
D* ratchet arm	⅝"	1"	2⅝"	W	1
E ratchet	½"	⅝"	21¼"	W	1
F uprights	½"	⅝"	20¼"	W	2

*Cut oversized and trim to finished size according to the instructions.

Materials Key: W–walnut

Supplies: #8x1¾" flathead wood screws (2), #6x1" panhead wood screw (1), ¼" walnut dowel rod 6" long, .025x4x4" copper sheet, ¾" copper pipe cap, finish.

Buying Guide: Brass Ager: 8 oz., item 941-092, $5.95 plus shipping from Woodworker's Supply, 1108 North Glenn Road, Casper, WY 82601. Call 800/645-9292.



5 Drill the ¼" holes in the uprights using the ¼" holes in the upper bolster as a guide.

6 Secure the upper bolster to the uprights with two glued ¼x1¼" walnut dowels.

7 Sand the top edges of the uprights flush with the top of the upper bolster.

Craft the copper candle holder

1 From .025" copper sheet, cut out the candle tray shown in the Candle Tray detail. Use a scrollsaw and metal-cutting blade. Clean and deburr the edges with fine sandpaper.

2 Cut a centered 3¼"-diameter hole through a ¾x5x5" block of scrap wood. Press the candle tray into the hole so the seam closes. Apply soldering flux to the seam and secure it with solder for copper plumbing, as shown in **Photo B**.

3 Flip the wood block over, and solder a ¾" copper pipe cap onto the center of the candle tray, as shown in **Photo C**. For a good soldering bond, remember to always clean the mating surfaces with a light sanding prior to fluxing. Concentrate the flame on the inside of the cup so that the already-soldered seam doesn't heat up to the point of separating.

4 Apply protective masking tape to the jaws of a pair of pliers. Hold the candle tray assembly with the pliers, set it on a piece of scrap, and drill a 5/32" hole through the center of the pipe cap.

5 Sand excess solder from the candle tray assembly with 120-grit abrasive, and smooth any sharp edges.

6 Submerge the candle tray assembly into Brass Ager for 15 minutes (see the Buying Guide, *above right,* for a source). Rinse the solution off and dry. This product produces a dark patina on the copper.

Some final assembly, then add a candle

1 Slide the ratchet/lower bolster assembly up through the hole in the upper bolster. Slightly file or sand the notched surfaces of the lower bolster so it moves freely up and down the uprights.

2 Screw the base (A) to the uprights with #8x1¾" wood screws, as shown in **Photo D**. (Note that we used double-faced tape to temporarily hold the base to the uprights. And, we maintained correct spacing between the lower bolster and uprights by inserting two temporary cardstock spacers.)

3 Attach the candle tray assembly to the ratchet with a #6x1" panhead screw, as shown on the Exploded View.

4 Disassemble the screw-fastened parts, and apply finish. We used Minwax red mahogany Wood Finish, followed by a coat of Watco medium walnut Danish Oil Finish. Then, we applied two coats of Deft Semi Gloss Clear Wood Finish.

Written by **Bill Krier** with **Kevin Boyle**
Illustrations: **Kim Downing; Lorna Johnson**
Photographs: **Baldwin Photography; Wm. Hopkins**
Opening photo location: **Finer Things, L.L.C., Urbandale, Iowa**

You can spend hours setting up your tablesaw and fine-tuning it into a precisely parallel ripping machine. But your ability to make accurate crosscuts hinges on the factory-supplied miter gauge—an accessory not noted for its precision. That's why we rounded up eleven aftermarket crosscutting devices to see how they compare. Although these accessories cost from $100–250, many are worth it because they offer longer fences for better workpiece support, easier-to-read scales, and positive stops at more angles than your tablesaw's original-equipment gauge.

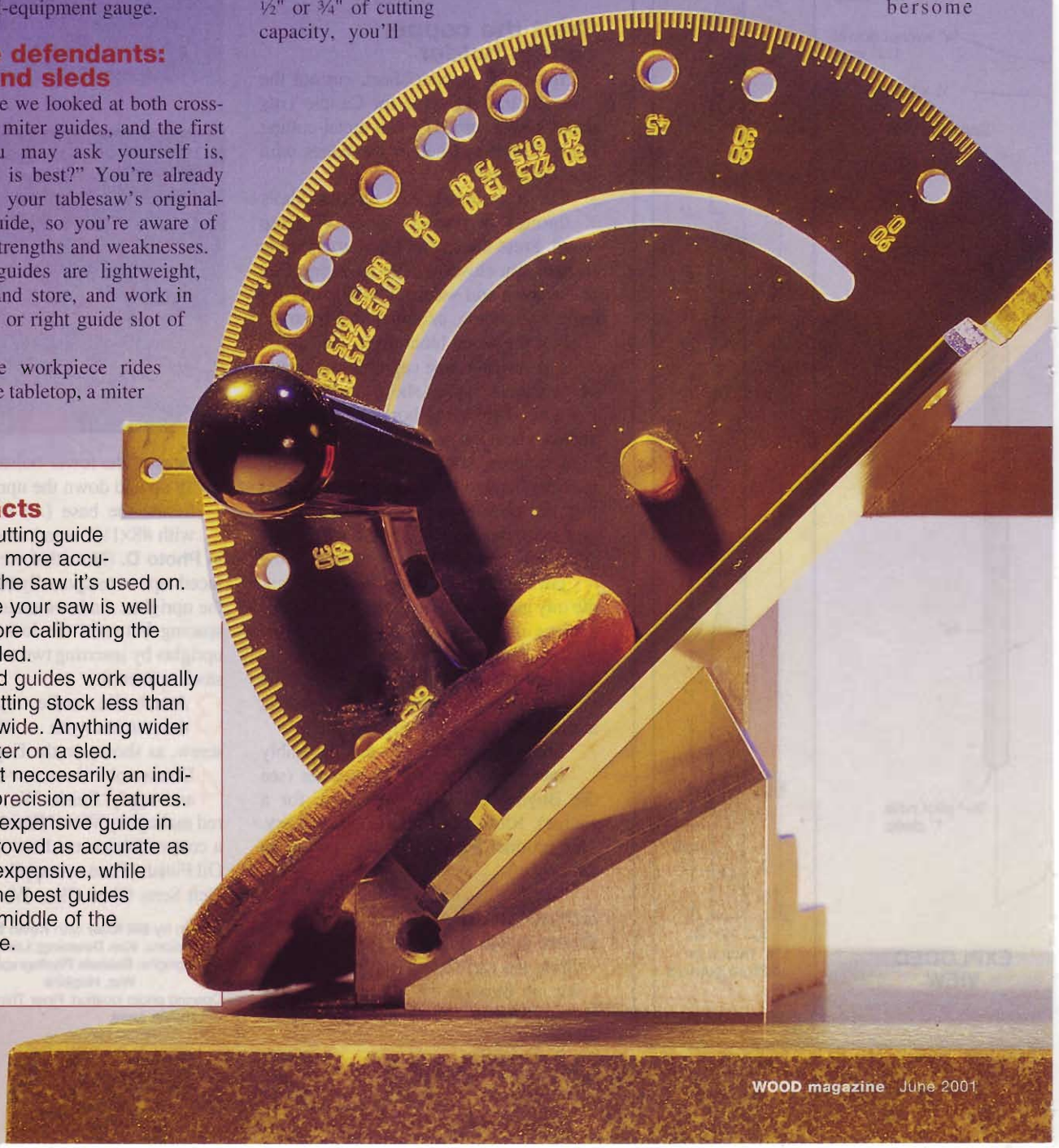
Meet the defendants: Guides and sleds

For this article we looked at both crosscut sleds and miter guides, and the first question you may ask yourself is, "Which style is best?" You're already familiar with your tablesaw's original-equipment guide, so you're aware of that genre's strengths and weaknesses. Most miter guides are lightweight, easy to use and store, and work in either the left or right guide slot of your saw.

Because the workpiece rides directly on the tabletop, a miter guide allows you to use the complete thickness-cutting capacity of the saw blade, usually about 3½". However, that extra capacity comes at a price. Friction between the tabletop and the workpiece can steer or mar large workpieces. And, although some guides offer hold-down clamps, they can only clamp the workpiece directly over the guide bar—not close enough to hold short pieces.

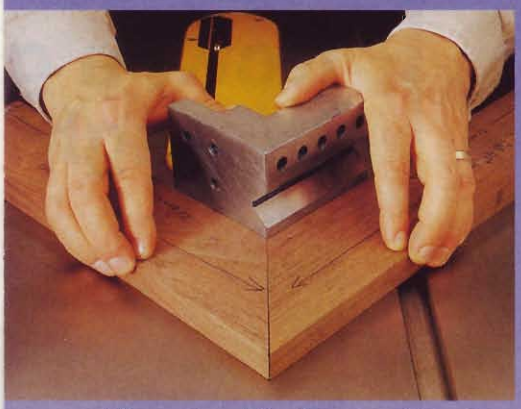
On the other hand, the expansive surface of most crosscut sleds provides lots of support for large panels, making them a good choice for cabinetmakers. Although you will sacrifice ½" or ¾" of cutting capacity, you'll gain a zero-clearance edge that most guides can't provide. That's because most sleds come oversized and require you to fit the miter bar, then rip off the excess sled surface. That reference edge makes it easy to line up your cuts, and reduces tearout.

However, you can't use a sled to make beveled cuts on a left-tilting saw without damaging the zero-clearance edge. And only one of the sleds we tested can be used in both slots of your saw. (In-Line Industries sells a separate right-slot configured version of their Dubby jig.) Sleds are cumbersome



Fast Facts

- A crosscutting guide can be no more accurate than the saw it's used on. Make sure your saw is well tuned before calibrating the guide or sled.
- Sleds and guides work equally well for cutting stock less than 10" or so wide. Anything wider works better on a sled.
- Price isn't neccesarily an indication of precision or features. The least expensive guide in our test proved as accurate as the most expensive, while some of the best guides fell in the middle of the price range.



After making 45° miter cuts with each accessory, we checked the angles against a precision 90° angle block, looking for gaps in the joint.

to handle and store, and require you to remove your saw's anti-kickback pawls so you can slide the accessory back to its starting position after the cut.

The discovery phase: Our testing process

Before we could check the accuracy of these accessories, we made sure our test saws—a new DeWalt DW746 and an older-model Craftsman tablesaw—were perfectly aligned. We chose these saws because Craftsman (and Ridgid) tablesaw miter slots are slightly narrower than the slots on a typical tablesaw, such as the DeWalt.

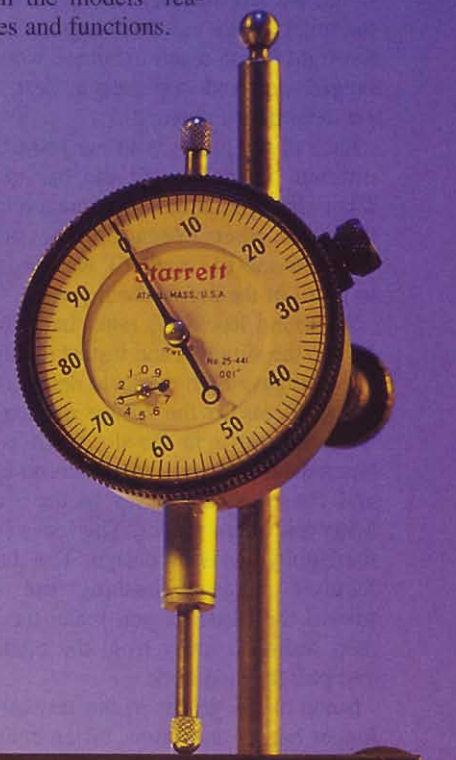
After assembling the miter guides according to the manufacturers instructions, we calibrated each, if possible, to within ⅛° of perpendicular to the blade. Using a granite surface plate, machinist's angle block, precision angle gauges, and a dial indicator, as shown *below*, we then calculated the accuracy of the guides at various angles.

We set each miter guide to its 45° setting, and used precision angle guides and a dial indicator to check the guide's accuracy. If the indicator didn't stray from zero in its pass along the bar, the guide was dead-on.

To confirm these readings in the real world (and to check the sleds, which are too large to test with that method) we tested them the way you would: by making joints. Using each model, we crosscut two pieces of stock at 0°, flipped one piece, butted the cut ends together using the surface plate as an edge reference, and looked for gaps in the joint.

We repeated the test with a 45° miter joint, this time using the 90° angle block as a reference (see photo *above left*), and again noted the quality of the joint. To triple check the accuracy, we then cut a square picture frame using 45° miter joints to ensure all four joints fit together properly.

Finally, we used each product to make dozens of cuts at various angles in different widths, thicknesses, and species of wood. This helped us get familiar with the models' features and functions.



miter masters

we put 10 aftermarket crosscut accessories on trial

Passing the bar exam and other key concerns

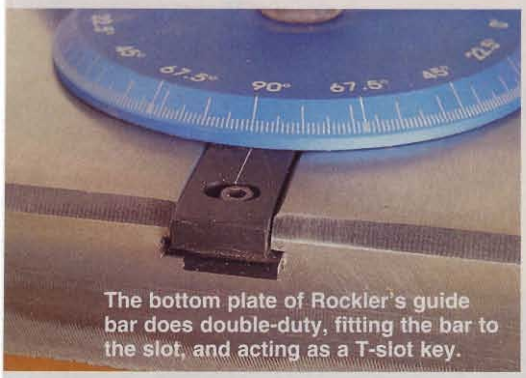
•***The guide bar.*** A well-fitting guide bar on a crosscutting accessory is key to its performance—the bar should slide easily in the slot without rattling side to side. If the bar fits sloppily, the accuracy of the miter angles can be compromised; a too-tight fit can result in burned wood or ragged start-and-stop cuts at best, and personal injury at worst.

Each of the products in our test uses a different method to fit the bar to the miter slot. And, although some are more work than others (Vega still relies on the old peen-and-file method), we were able to fit all of the bars to both saws.

We found Rockler's miter bar, shown *below*, the simplest and fastest to adjust. We also gave high marks to designs that allow access to the fitting mechanism while the bar is in the slot, such as the tapered set screws in the Osborne EB-2 and the expansion discs in the Accu-Miter and Incra guides. The loose fit of the Dubby bar is by design: The manufacturer suggests pushing the sled toward the blade as you make the cut, then sliding it away from the blade as you pull the sled back.

Some of the guides in our test offer a longer bar as an option. When coupled with a T-slot on your saw and a T-slot key on the guide or sled, a longer bar increases the maximum width of material you can cut accurately.

•***Miter scales and stops.*** Here's an area where most aftermarket guides far exceed your saw's standard-equipment gauge. Easy-to-read scales and accurate, solid miter stops give you the confidence to tackle complex assemblies such as multisided boxes or frames.



The bottom plate of Rockler's guide bar does double-duty, fitting the bar to the slot, and acting as a T-slot key.

All those tiny little hash marks on the protractor scales don't give you much margin for error. But, the linear scales on the Osborne EB-2 and the Dubby sled have more room between degree marks. We found it easy to eyeball even fractions of degrees on these models.

Many of the crosscut accessories we tested provide a mechanism for calibrating the miter scale. The Woodhaven 4900, Osborne, and Rockler guides make no such provisions, but straight out of the box were within 1/30° of perfect. The rest, we found, are relatively easy to calibrate following the manufacturers instructions. Calibration is a fussy process and the other guides were only as accurate as we took the time to make them. But we liked that we could realign these guides should they ever be dropped or damaged.

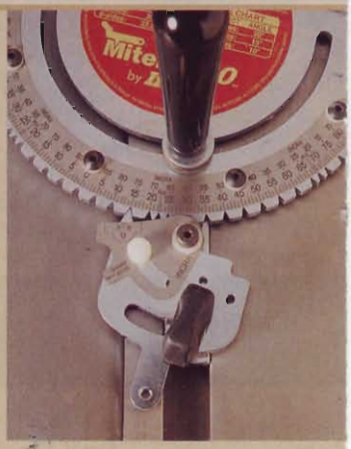
Miter stops on many of the models in our test involve a tapered or threaded pin that locates in a preset hole on the protractor head or sled surface. Rockler's Sure-Loc guide has no visible stops, but instead uses a pair of matching racks that fit together like stacked poker chips for effortlessly positive stops every 2½°. Likewise, Jointech's fence has hidden ball detents every ½°.

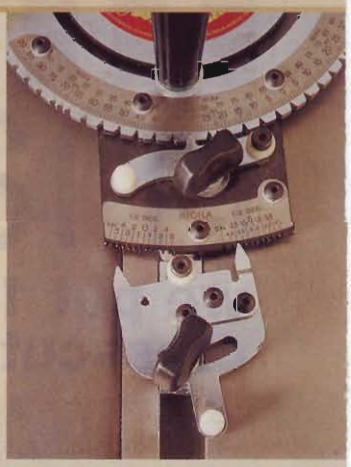
For sheer numbers, you can't beat the Incra 3000. Like the 1000, the 3000's protractor-style head has a pawl that engages notches spaced every 5° around the rim. The 3000 then adds a secondary notch-and-pawl system with positive stops for every ½° within that 5° range.

•***On the fence.*** Except for the Rockler guide, which offers one as an accessory, all of the guides and sleds in our test come with an extruded-aluminum fence. Most also include a length stop, some of which further offer a mechanism to fine tune the stop. If you like to use a wooden auxiliary fence face, the Incra 3000 flip-stop is the only one that works with or without a ¾"-thick add-on face.

As we mentioned earlier, most of the sleds in our test can't switch from the left miter slot to the right slot. But most of the guides make this transition pretty easily. Loosen a couple of screws or knobs, slide the fence to the other end, and you're back in business. The Osborne fence is an integral part of the guide so, to go right, you must remove two shoulder bolts and the handle, swing the diagonal bar to the other side, and reattach the fence.

Now, a g through





uided tour the guides

Accu-Miter Model 34" Kit

What we liked: The miter-locking handle is the largest of any guide in the test. And, because it's the ratcheting-type, you can rotate it out of the way to not impede your vision of the miter scale. Accu-Miter's telescoping fence features a handy micro-adjust thumbwheel on the stop for fine-tuning your length of cut.
What we didn't like: This beast is heavy. At 10 pounds, it's nearly twice the weight of most of the other guides. Also, we found .020" play between the rear of the tapered stop pin and its housing that affected this guide's accuracy. You can't attach a wooden fence face because of its telescoping fence.
Options: Manual hold-down clamp, pneumatic hold-down clamp.

Incra-Miter 1000

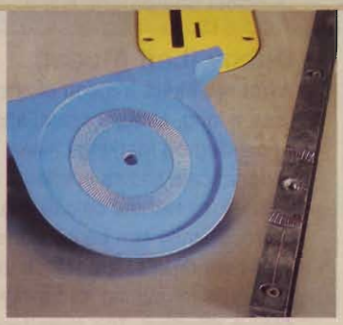
What we liked: This guide has positive stops every 5°, plus at 22.5° and 67.5°. Or, by disengaging the stop pawl and rotating the hairline cursor into place, we found we could hand-tune to any ¼° increment. A chart on the protractor face shows what angles to cut for many-sided figures. And, when switching the guide from slot to slot, you can change the fence-mounted tape measure to read correctly.
What we didn't like: Too many knobs. It seemed like everytime we went to change angles we were forgetting to loosen the handle, the pawl thumbscrew, or the cursor screw. Also, the swing-in cursor is razor-thin metal, and we wonder how accurate it will stay after being accidentally bent a few times.
Options: 27", 36", and 52" flip fence, flip stop.

Incra-Miter 3000

What we liked: In addition to the 5° incremental stops on the Incra-Miter 1000, this model adds a secondary stop system, shown at *left*, that provides stops every ½°. That's 364 positive, no-brainer stops in all. We also liked the standard-equipment flip-stop fence and flip stop. It meshes with the fence face to prevent the pointy end of a mitered workpiece from bypassing the stop.
What we didn't like: That secondary stop system burned us more than once when we went from some fractional angle to, say, a 45° angle. We had to train ourselves to return the secondary stop to "0" before cutting.
Options: 18", 36", and 52" flip fence, flip stop.

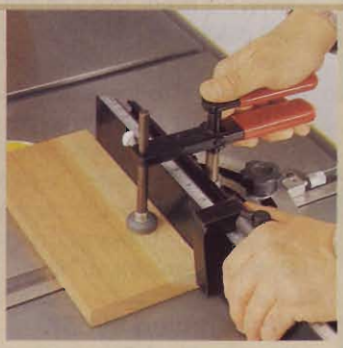
Osborne EB-2

What we liked: This guide abandons the traditional protractor-style design in favor of a triangular configuration that makes it exceptionally ridgid and accurate. The reversible fence has no-slip abrasive on one side to keep stock from creeping, and is smooth on the other. One unexpected benefit: The tapered set screws that fit the bar to the slot can be tightened to lock the bar in the slot. You can then use the smooth fence face to shape cove molding, as shown at *left*.
What we didn't like: The fence can't get within 2" of the blade, so short workpieces aren't supported. And, to switch fence faces (or from one slot the other) requires almost complete disassembly.
Options: None.



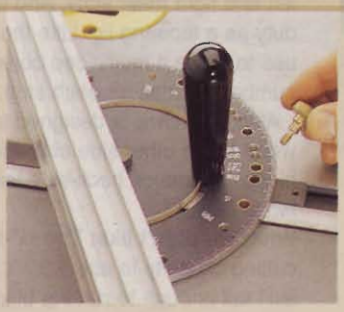
Rockler Sure-Loc

What we liked: It's lightweight, simple to use, and dead-on accurate right out of the box. The "invisible" stop system, shown at *left*, mates like two stacked poker chips, with positive stops every 2½°. You can add an optional fence and flip stop, or make your own. But we liked the size and weight without the fence for using on other stationary tools, such as the router table or belt/disc sander. At $90, the Sure-Loc is also the least expensive model in our test.
What we didn't like: What if you want to cut a five-sided object? Can't do it; That requires a 36° angle—not a multiple of 2½°. Also, because of the design of the bar-fitting mechanism, you have to slide the entire bar out of a T-slot to remove it.
Options: 24" fence, flip stop.



Vega PMG24

What we liked: If your eyesight isn't what it used to be, you'll like the large numbers on the protractor scale. This is also the only guide in the test to come with a stock hold-down clamp (*left*).
What we didn't like: The guide bar that came with our PMG24 was bowed .006" in the middle, and required filing to fit into the miter slot. John Snoeyenbos of Vega told us that's just the nature of cold rolled steel. ".006–.007" out isn't that unusual," said Snoeyenbos. At 11 pounds, this is the heaviest guide in the test.
Options: None.



Woodhaven 4900/4824

What we liked: Out of the box, this miter guide was calibrated perfectly. The stop pin fits like a hand in a glove, and bronze bushings at the most common stops should hold up well with repeated use. We tested this guide with the optional Upgrade Kit, which includes a 24" extruded-aluminum fence and a flip stop.
What we didn't like: The cursor for the miter scale is on the bar, and the scale itself is on the protractor head, which makes aligning the cursor with a specific degree mark on the head tricky.
Options: Fences from 12–48", three-position flip stop, box and tenon jig, angle heads.

Four ways to go sledding

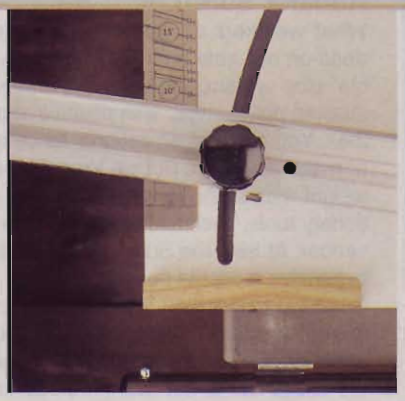
Delta 36-205

What we liked: The combination of a large surface area and a T-slot key give this sled the ability to carry a 20¾"-wide panel through a 90° cut. The quick-release hold-down also comes in handy when switching between thicknesses of stock. However, the hold-down is fixed about 6" from the edge of the sled, so it won't work on shorter workpieces.

A triangle-shaped stopblock provides a positive stop when making miter cuts with the "short side" against the fence. And, this sled is the only product in the test with a built-in blade guard to protect you.

What we didn't like: We had trouble seeing well enough around or through the blade guard to line up our cut mark with the zero-edge of the sled. Also, the 36-205's weight—33 pounds—sometimes made it difficult to get the sled on its way. (The T-slot key would sometimes bind in the slot if the sled wasn't level with the saw table.)

Optional equipment: None.

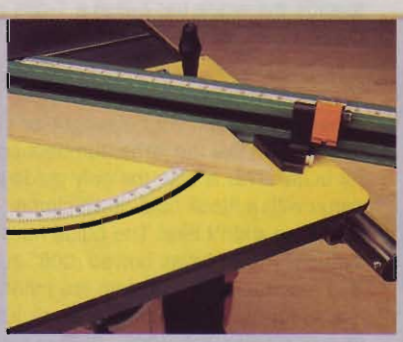


Dubby (Left Model)

What we liked: Instead of showing the miter angles on a curved scale, the Dubby uses a long, straight scale, shown at *left*, at the outboard end. Large gaps between whole-degree markings make it easy to hit fractions of a degree without stops. A secondary scale shows precisely where to position the fence for multiple-sided objects up to 20 sides without calculating. Also, the hold-down clamps fit into a channel on the fence, so they can be postioned close to the blade for safely cutting short pieces.

What we didn't like: It took us several cuts to get used to pushing the sled toward the blade for cutting and away from the blade when returning to start, but the system seems effective. The manufacturer also offers an optional "self-aligning" miter bar, called A-Line-It, that uses spring plungers to keep the bar flat against one side of the miter slot.

Optional equipment: Right-side sled, A-Line-It miter bar.

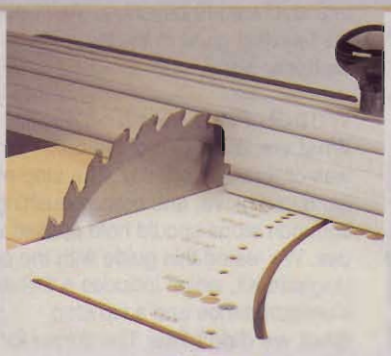


Jointech JSM-48

What we liked: This sled has ball-detents every ½° on the miter scale for a total of 200 positive stops. A triangular-shaped stop attachment, shown at *left*, provides a positive, micro-adjustable stop even when measuring from the "short" side of the workpiece. The fence scale holds its accuracy at any angle, from +50° to -50°, thanks to dual fence rules. As on the Incra-Miter 3000, the flip stop meshes with the fence to prevent accidental bypass of the stop.

What we didn't like: The pivot point of most sleds is near the bottom right edge of the sled, but Jointech's pivot point is in the middle of the right edge. This gives you a full 50° swing both ways, but limits your workpiece width to about 13".

Optional equipment: None.



Woodhaven 4955K

What we liked: This sled is the only one in our test that works equally well in both the left and right miter slots. And it's also the only product in our test that can do double duty as a tapering jig. Like the Dubby, this sled saved us calculating what angle to use to make a multisided object. Stop holes on the sled list both the angle and the number of sides for each stop.

Also, the fence is designed to straddle the sawblade, and by adding a scrap of plywood to the other side of the fence, you can keep the offcut from falling back into the blade. To reduce back-side tearout, Woodhaven includes a removable ½"-plywood fence face.

What we didn't like: The ¾"-thick sled already reduces your tablesaw's thickness-cutting capacity to about 2¾". But the bridge of the aluminum fence, shown at *left*, isn't tall enough to run the blade at full height, making 1¾" the maximum thickness we could cut. And, if you want to miter at any angle other than the ones for which there are stops, you're on your own: This sled has no miter scale to set the angles in between.

Optional equipment: Fence extension, flip stop.

THE STRAIGHT STUFF ON ELEVEN CROSSCUTTING ACCESSORIES

MANUFACTURER/ IMPORTER	MODEL	LENGTH	MITER BAR: METHOD OF FIT (1)	MITER BAR: T-SLOT KEY? (YES, NO)	MITER BAR: FENCE LENGTH (2)	MAXIMUM STOP LENGTH	CAPACITY (3): MAXIMUM MITER LEFT (DEGREES)	CAPACITY (3): MAXIMUM MITER RIGHT (DEGREES)	MITER SCALE: NUMBER OF POSITIVE STOPS	MITER SCALE: STOP STYLE (4)	PERFORMANCE RATINGS (5): FITTING MITER BAR TO SLOT	MITER SCALE CALIBRATION	MITER SCALE READABILITY	MITER STOP ACCURACY	CHANGING FROM LEFT SLOT TO RIGHT SLOT (6)	ACCURACY OF FENCE STOP	WARRANTY (YEARS) (7)	COUNTRY OF ASSEMBLY (8)	WEIGHT (POUNDS)	SELLING PRICE (9)	COMMENTS
GUIDES																					
ACCU-MITER	18-34	20"	ED	Y	18"	34"	50	50	9	SP	G	F	G	E	F	G	E	1	U	10	$179	A heavy guide with slight play in the miter-stop mechanism.
INCRA-MITER	1000	17 1/16"	ED	Y	18 1/4"	17 1/4"	90	90	41	RP	G	F	E	E	E	G	G	1*	U	4	99	One of the best values in the test, with 1/4° markings.
	3000	20 1/4"	ED	Y	27"	27 3/4"	90	90	364	RP	G	F	E	E	E	G	E	1*	U	8	240	The most expensive guide in the test, but also offers the most stops.
OSBORNE	EB-2	21"	TS	Y	25 1/2"	27"	45	45	7	BD	E	E	E	E	E	F	E	1	U	4	160	A rigid guide with a reversible fence so you can choose slip or no-slip surface.
ROCKLER	Sure-Loc	17 1/2"	SP	Y	7"*	N/A	90	90	74	DR	E	E	G	E	E	E	N/A	LIFE	U	1	90	Accurate out of the box, but can only cut angles at 2 1/2° increments.
VEGA	PMG24	20"	FP	N	24"	42"	60	60	9	SP	F	F	G	E	E	G	E	1	U	11	160	Heavy unit with no fitting system for bar.
WOODHAVEN	4900/4824	17 3/4"	SS	Y	24"	24"	90	90	15	TP	G	E	G	E	E	E	E	LIFE	U	6	178	Lightweight and accurate with no calibration.
SLEDS																					
DELTA	36-205	28"	SB	Y	42"	60"	45	0	2	BI	G	G	E	E	E	N/A	E	2	T	33	180	A weighty sled, and the only model with a built-in blade guard.
DUBBY	Left Model	24"	LF	N	30 1/2"	52"	70	0	1	BI	N/A	G	E	E	E	N/A*	E	LIFE	U	13	170	Sometimes, simple is best. Our pick for top sled.
JOINTECH	JSM-48	23 1/2"	S	N	28 7/8"	49"	50	50	200	BD	G	G	E	E	G	N/A	E	2	U	15	250	Positive stops every 1/2°. Maximum stock width is only 13", though.
WOODHAVEN	4955K	23 3/4"	SS	N	21 1/2"	32"	45	0	22	PB	G	G	E	G	E	G	G	LIFE	U	16	202	Stops at major angles, but no scale for angles between. Maximum stock thickness is 1 3/4".

NOTES:

1. (ED) Expansion discs
   (FP) File and/or gees
   (LF) Loose fit
   (S) Set screws
   (SB) Split bar
   (SP) Sliding plate
   (SS) Set screws and plugs
   (TS) Tapered set screws
2. (*) Optional lengths available.
3. With guide/sled in left miter slot.
4. (BD) Ball detents
   (BI) Bolt in threaded insert
   (DR) Dual racks
   (PB) Pin in bushing
   (RP) Rack and pawl
   (SP) Spring-loaded pin
   (TP) Threaded pin
5. E Excellent
   G Good
   F Fair
6. (*) Right-of-blade-sled also available.
7. (*) Lifetime warranty on racks.
8. (U) United States
   (T) Taiwan
9. Prices current at time of article's production.

For specifications on other types of tools, click on "Tool Comparisons" at www.woodmall.com.

For more information:

Delta
www.deltamachinery.com
800/438-2486

In-Line Industries (Dubby)
www.in-lineindustries.com
800/533-6709

JDS Company (Accu-Miter)
www.thejdscompany.com
800/382-2637

Jointech
www.jointech.com
800/619-1288

Osborne Manufacturing
www.osbornemfg.com
800/852-9655

Rockler
www.rockler.com
800/279-4441

Taylor Design (Incra)
www.incra.com
972/418-4811

Vega
www.vegawoodworking.com
800/222-8342

Woodhaven
www.woodhaven.com
800/344-6657

So, what's the verdict?

Once calibrated, all of the guides delivered consistently accurate angles, so the choice comes down to the kind of woodworking you do (and the kind of woodworker you are).

For crosscutting stock less than 12", the Woodhaven 4900/4824 and Osborne EB-2 delivered dead-on miters right out of the box. After we calibrated them, both the Incra 1000 and 3000 guides gave us predictable, repeatable results over a full 180° range. On the other hand, if you never cut odd angles, Rockler's Sure-Loc guide absolutely nails all the major miter angles (as long as they're a multiple of 2½°) for less than $100.

For cutting panels or wider stock, consider a sled. We think you'll be thrilled with the price, performance, and simplicity of the Dubby.

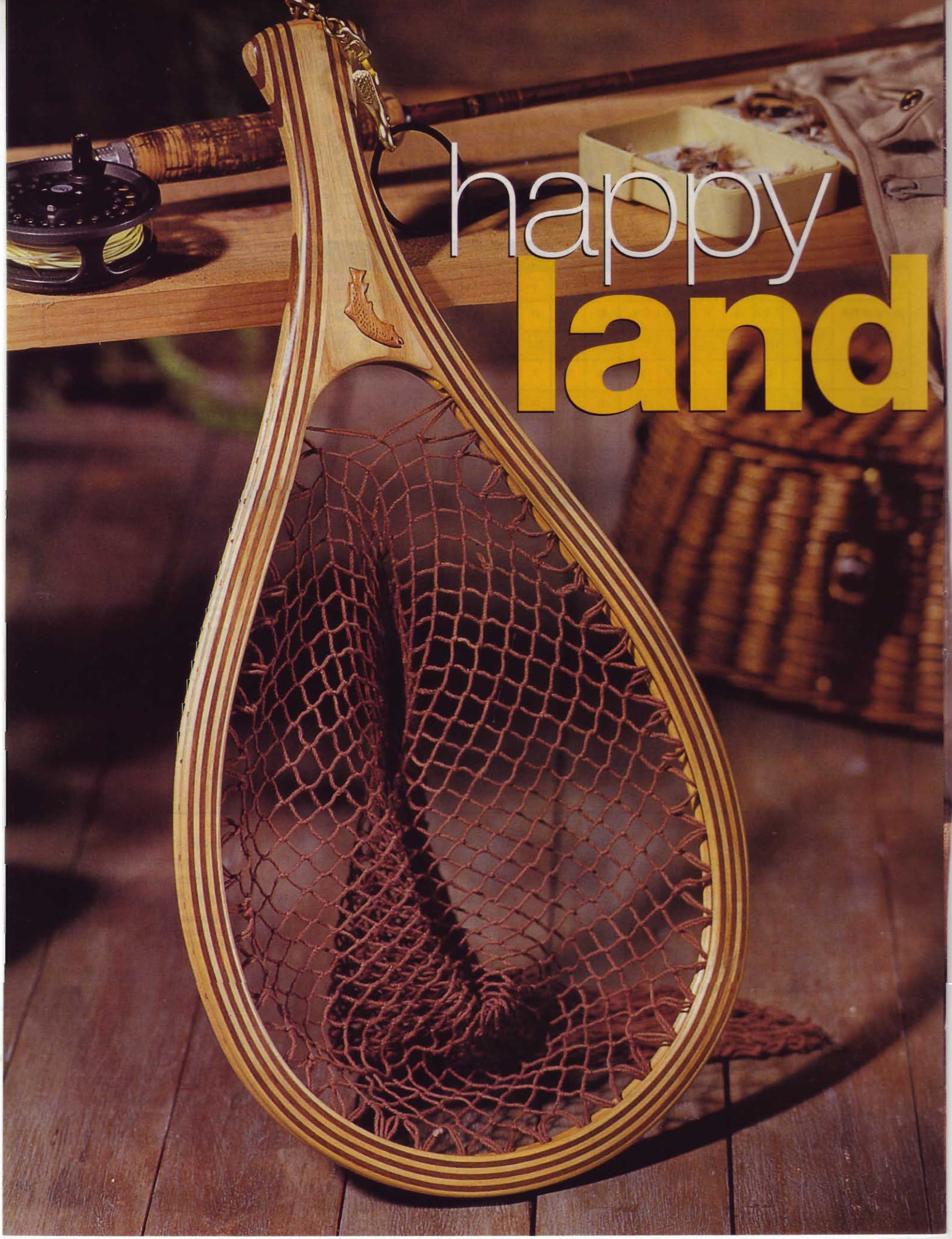
Written by **Dave Campbell**
Technical consultant: **Garry Smith**
Photographs: **Baldwin Photography**

One more for the road

Just as we were going to press, Chris Taylor from Taylor Design told us of their new Miter 5000 by Incra. This sled incorporates the multistop protractor and fence system of the Incra 3000 guide in a crosscut sled. We'll test it and share our findings in an upcoming issue of *WOOD*® magazine.

Now, you be the jury

Chances are, you've had your hands on one or more of these crosscutting accessories, and we'd like to know what you think. Log into our Interactive Tool Review at www.woodmall.com, and see how your fellow woodworkers and the manufacturers responded to this review.



happy land

ing

It's easy to get a handle on this project...while you're laminating the frame, of course.

Fishing definitely will be picking up the day you give this sportsman's landing net a try streamside. Before then, however, you'll have plenty of fun making it in your shop. In the process you'll learn how to cold-laminate strips of wood together to create the handsome frame. Our full-size patterns help you shape the form for this gluing operation, guaranteeing your success.

Fashion a fancy handle

1 From ¾" stock, rip and crosscut one mahogany and two ash boards to make three pieces measuring 3×12". Plane or resaw the mahogany to 3/16" thick. Machine the ash to make one piece ⅛" thick and one ⅝". Trim all three pieces to 7" long. Set the thicker ash piece aside for now.

2 Turning to the *WOOD PATTERNS®* insert, make two copies of the full-size Handle pattern.

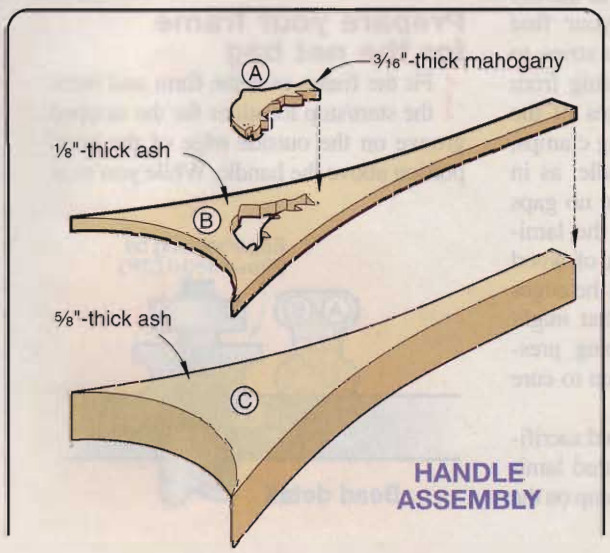
3 Temporarily adhere the mahogany to the ⅛" ash using double-faced tape. Then, using spray adhesive, apply one copy of the handle pattern to the mahogany face.

4 Drill a blade start hole through the taped pieces in the waste area of the fish's mouth using a 1/16" bit.

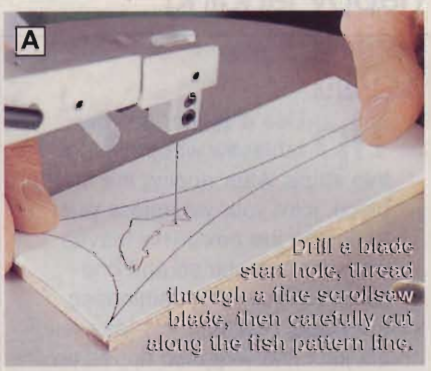
5 Thread a fine, No. 2 scrollsaw blade through the hole and cut out the fish, part A, as shown in **Photo A**. At the same time you will create the fish cutout in the ash piece.

6 Adhere the fish to scrap with double-faced tape. Using a scratch awl and the dots on the fish pattern as a guide, stipple the fish top surface as in **Photo B**. Now, insert the awl's point deeper to create the eye. Peel off the fish pattern.

7 Give the fish a somewhat rounded, more realistic appearance by sanding over its sharp edges with a rotary carving tool, flap sander, or by hand-sanding. After sanding, you may need to re-establish a few of the stipples. Remove the fish from the scrap.



HANDLE ASSEMBLY



Drill a blade start hole, thread through a fine scrollsaw blade, then carefully cut along the fish pattern line.

Hold the scratch awl shaft perpendicular to the side of the fish and over the pattern mark. Insert the tip just below the surface of the wood.

8 Separate the mahogany from the ⅛" ash piece. Now, glue the ⅛" ash piece with the fish cutout to the ⅝" piece of ash, combining the handle top (B) to the handle bottom (C). (We used Titebond II exterior glue for the lamination.)

9 Carefully apply the second copy of the handle pattern to the handle-top surface, aligning the fish pattern over the cutout. Next, bandsaw the handle to shape, cutting just outside the line and sanding to the line with a drum sander.

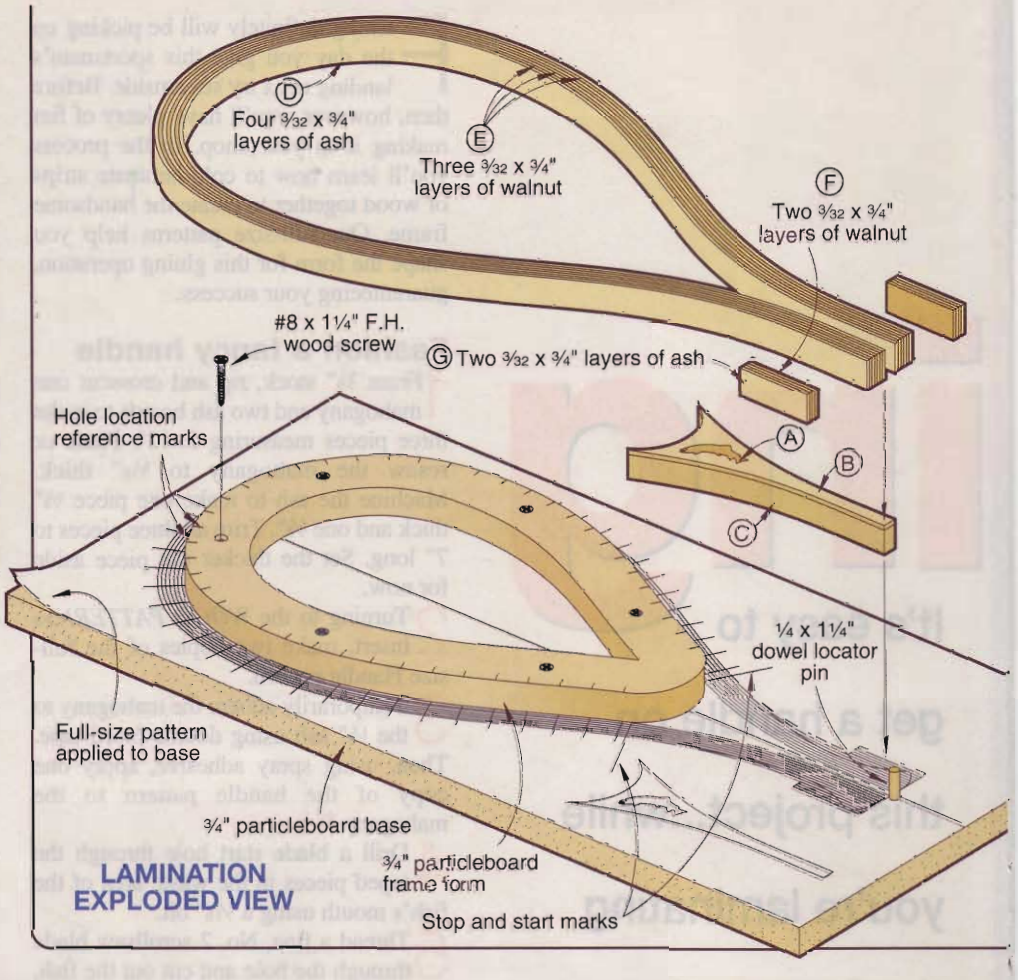
Laminate a sturdy frame

1 Make three copies of the Frame Form pattern. Set one aside. Scissor out just the tear-drop shape pattern from one copy and apply it to a piece of ¾" scrap particleboard. Bandsaw around the outside of the pattern, then scrollsaw along the inside line, removing the waste piece. Sand the form to final shape.

Cut a 12×24" form base from particleboard and apply the second pattern to it. See our tip for preventing glue from sticking to the form.

shop tip To protect the form and applied patterns from glue squeeze-out, we covered the contact surfaces of the base and frame form with clear packaging tape before joining the two parts together.

shop tip Use a splitter on your tablesaw when ripping thin strips. After ripping the first piece, joint your workpiece prior to ripping the next. This leaves you with one planed and one sawn surface when laminating the strips, resulting in a less visible joint line. We also ripped an extra sacrificial strip to protect the outer edge of the frame when we applied the clamps. We covered this strip with packaging tape to keep it from adhering to the frame and form.


D
Four 3/32 x 3/4" layers of ash
E
Three 3/32 x 3/4" layers of walnut
F
Two 3/32 x 3/4" layers of walnut
#8 x 1 1/4" F.H. wood screw
G Two 3/32 x 3/4" layers of ash
Hole location reference marks
A
B
C
1/4 x 1 1/4" dowel locator pin
Full-size pattern applied to base
3/4" particleboard base
3/4" particleboard frame form
Stop and start marks

LAMINATION EXPLODED VIEW

2 Drill the screw and dowel holes, where indicated, on both form pieces. See the Lamination Exploded View drawing. Position the frame form on the base, and drive the screws to secure it in place. Insert the 1/4" dowel locator pin.

3 With the form complete, rip four ash strips and three walnut strips to 3/32×55" using 3/4×3×55" stock. See our tip for ripping thin strips.

4 Crosscut the ash strips to 52" to make four D parts. Likewise, cut the walnut strips to make three E parts. Using an auxiliary wood fence on your miter gauge and the waste from the previous two cuts, crosscut two walnut pieces and two ash pieces to 2" for parts F and G, respectively. These will be added to the frames flaired handle.

5 Organize the ash and walnut strips (D, E) as in the Lamination Exploded View drawing, and place alignment marks midway along their edges at 26". Gather all of your clamps together. (You'll need about 15 bar clamps.)

Keep a plentiful supply of clamps on hand when wrapping the strips around the form. We used 15 in all.

Now, working fast, spread your glue on the strips (with the exception of the exposed surfaces of the inside and outside strip), and place them in order on edge on the form, aligning the edge marks with the form's centerline. Place the sacrificial taped strip on the outside of the lamination strips.

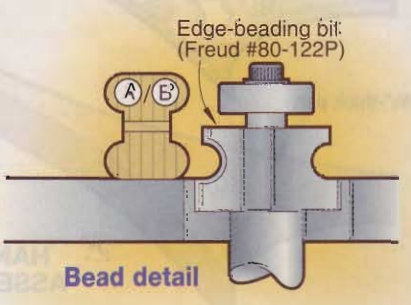
6 Beginning at the centerline at the top of the frame form, add your first clamp, pressing the lamination strips to the form's edge. Then, alternating from the left to the right edges of the form, apply the remaining clamps, working toward the handle, as in **Photo C**. Make sure that no gaps appear anywhere along the lamination. Also, use a block of wood and hammer to tap down the edges of any renegade strips that might rise up from the clamping pressure. Allow the lamination to cure for 24 hours.

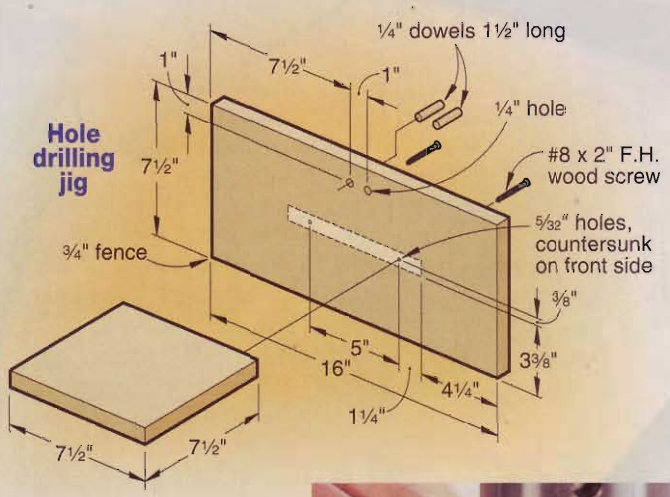
7 Remove the clamps and sacrificial strip from the cured lamination. Then, glue and clamp on the handle strips (F, G) in the order shown. Let the glue cure.

8 Remove the completed lamination from the form, and sand smooth to 11/16" thick. Scissor out the handle portion of the remaining Frame Form pattern copy, and apply it to the frame handle. Bandsaw and sand the handle to shape.

Prepare your frame for the net bag

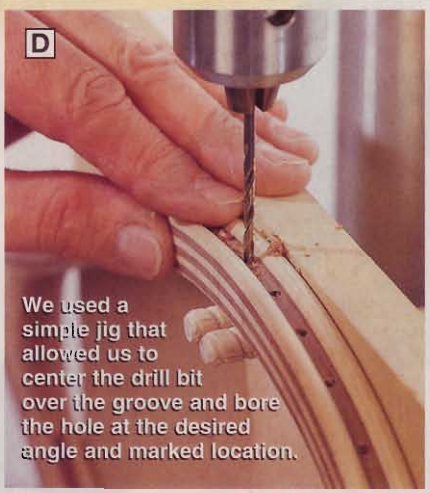
1 Fit the frame over the form and mark the start/stop locations for the stopped groove on the outside edge of the hoop portion above the handle. While you're at





it, mark the locations for the ⅛" holes for the net on the frame's face, where referenced on the Frame Form pattern.

2 Chuck an edge-beading router bit in your table-mounted router, using a ⅝" bearing. (We used Freud's No. 80-122P bit and added the bearing; see the Buying Guide and the Bead Detail. Now, rout along the inside edge of the oval, moving the frame from left to right. Flip the frame and complete the frame's beaded groove. Adhering to the stop/start marks, similarly rout the beaded groove along the frame's outside edge. Note how the machining reveals the walnut beneath.



We used a simple jig that allowed us to center the drill bit over the groove and bore the hole at the desired angle and marked location.

3 Replace the edge-beading bit with a ¼" round-over bit and rout the handle. Hand-sand the transition areas where the edge-beading bit started and stopped.

bill of materials

landing net

Case	Part	FINISHED SIZE T	W	L	Matl.	Qty.
A*	fish	3/16"	3"	7"	M	1
B*	handle top	⅛"	3"	7"	A	1
C*	handle bottom	⅝"	3"	7"	A	1
D*	frame strips	¾"	3/32"	52"	A	4
E*	frame strips	¾"	3/32"	52"	W	3
F	handle strips	¾"	3/32"	2"	W	4
G	handle strips	¾"	3/32"	2"	A	4

*Cut parts with an * oversized, and trim to finished size according to instructions.

Materials Key: A–ash, W–walnut, M–mahogany,

Supplies: Packaging tape (1 roll), #8×1¼" flathead wood screws, Titebond II glue, polyurethane finish.

Buying Guide: **Net bag:** Size 21", $11.99, plus $3.50 shipping. The Fly Rod Shop, Route 100, P.O. Box 960, Stowe, VT 05672. Phone 800/535-9763. www.flyrodshop.com.
Freud edge-beading router bit and ⅝" bearing with reducing bushing: #80-122P, $31.00, plus $4.95 shipping. A&I Supply, 800/260-2647.

4 Next, using scrapwood and ¼" dowels, construct the jig in the Hole Drilling Jig drawing.

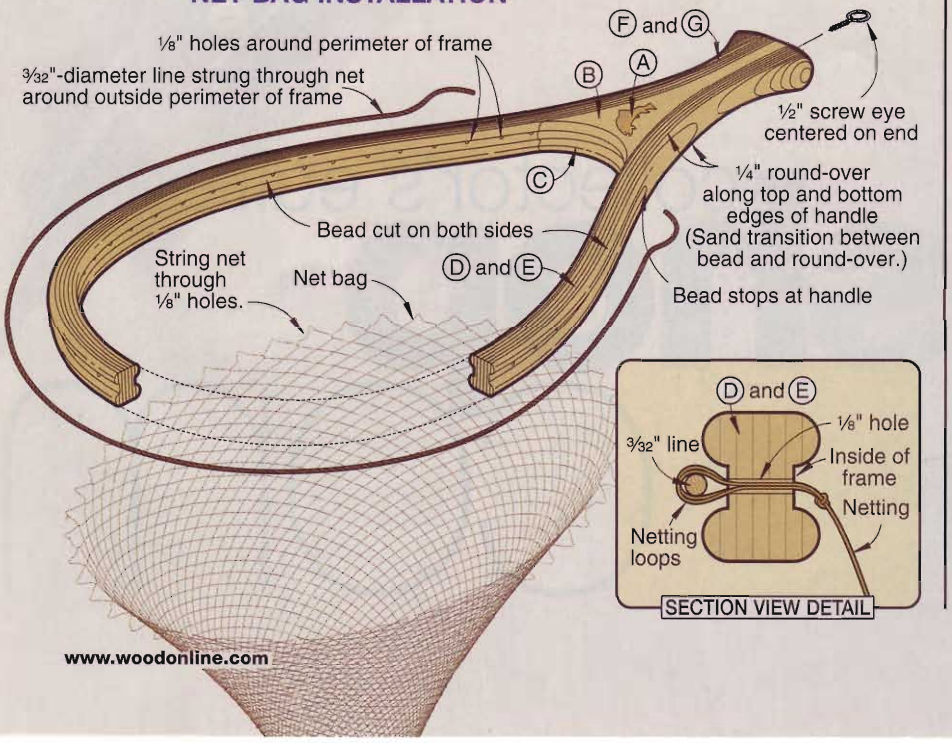
5 Install a ⅛" drill bit in your drill press. Now, clamp the jig to the edge of your drill-press table and rest the frame on the two dowels, as shown in **Photo D**. Adjust the table to the side while centering the bit between the dowels and in the groove at a marked location. Lock the table in place, and drill the netting hole. Moving from one mark to the next, drill the remaining holes.

6 Apply two-part epoxy to the bottom side of the fish, and fit it into the handle cutout. Clamp it in place until dry.

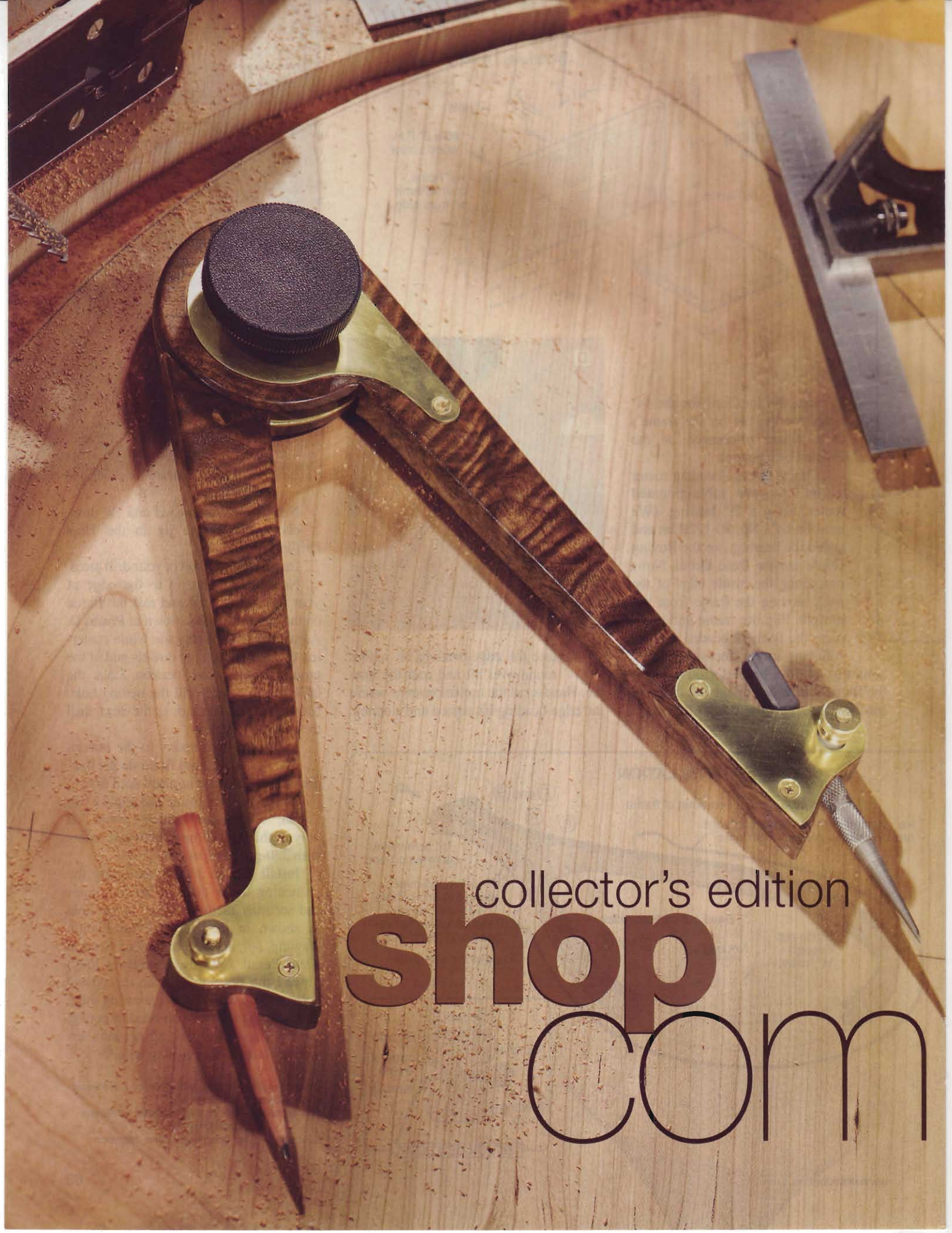
7 Finish-sand the frame and apply a finish. (We used three coats of polyurethane, sanding between coats with 320-grit sandpaper.)

8 Install the net bag by threading the netting loops through the ⅛" holes and securing them with 3/32" nylon line, as shown in the Net Bag Installation drawing, *left*, and accompanying Section View Detail. (We used builder's line.) Thread the line through the designated holes and tie the ends off, securing them permanently with a small bead of epoxy. Finally, press your landing net into service at your favorite fishing hole.

NET BAG INSTALLATION



Written by **Jim Harrold** with **Charles I. Hedlund**
Project Design: **Hal Downing**
Photographs: **Stafford Photography; Baldwin Photography**
Illustrations: **Kim Downing; Lorna Johnson**



collector's edition

shop com

pass

A fine tool for running circles around your work

Here's a great use for those prized wood scraps you stashed away for just the right project. Our compass incorporates an ingenious clamping system that holds a standard pencil (hexagonal or round) and a hardened pivot point, made from a nail set. Fit your tool with two points, and use it to scribe lines on sheet metal or other hard surfaces.

Begin with the laminated legs

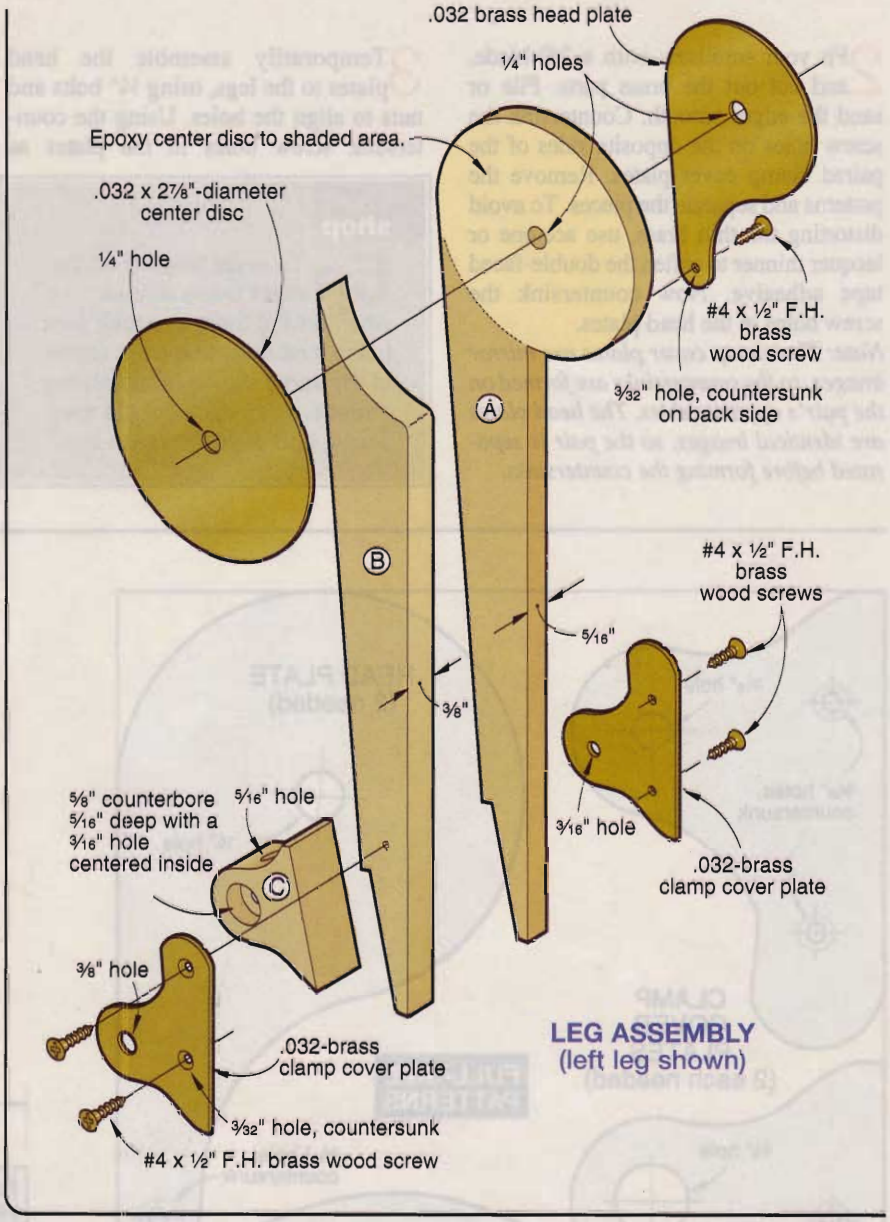
1 Resaw and plane stock to make two blanks 5/16×3×11" for the leg halves (A), and two blanks 3/8×1½×9½" for the leg halves (B). Using double-faced tape, stick the blank pairs together, keeping the ends and edges flush.

2 Make copies of the Leg Half patterns from the *WOOD PATTERNS*® insert, and adhere them to the paired blanks with spray adhesive. Bandsaw or scrollsaw, then sand the parts to the pattern lines. Drill the ¼" hole in the leg half (A) blanks, where indicated on the pattern.

3 Remove the patterns, and separate the paired blanks. Glue and clamp together the leg halves (A) and (B) in the configuration shown on the Leg Assembly drawing, keeping the edges aligned.

4 Cut the clamp block blanks (C) from ¾"-thick stock. Make copies of the clamp block patterns from *page 66*. Adhere them to the blanks, folding each pattern's top view portion over the end of the blank. Drill the 5/16" holes, top-to-bottom, through the blocks. Then drill the 5/8" counterbores with a Forstner bit and the 3/16" holes with a brad-point bit.

5 Bandsaw or scrollsaw the blocks to rough shape. Glue and clamp them to the ends of the legs, centering the blocks on the legs' width. When the glue dries, sand the blocks to final shape. Remove the patterns and sand the blocks' faces flush with the legs, then sand all the legs' edges flush.



6 Chuck a ⅛" round-over bit in your table-mounted router, and rout the legs' edges, where shown on the Exploded View drawing. The round-overs stop ¾" above the clamp blocks (C).

Now form and apply the brass trim

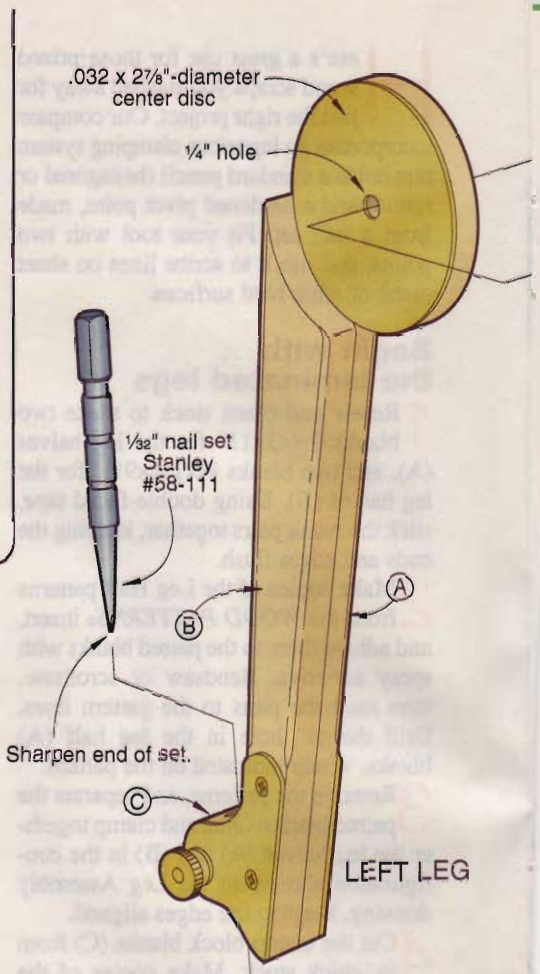
1 Stick two .032×4×6" brass sheets together with double-faced tape. See the Buying Guide for a complete hardware kit that includes the brass sheets. Copy the brass pattern from *page 66*, and adhere it to the brass sheets. Drill the holes where indicated. Do not form the countersinks.

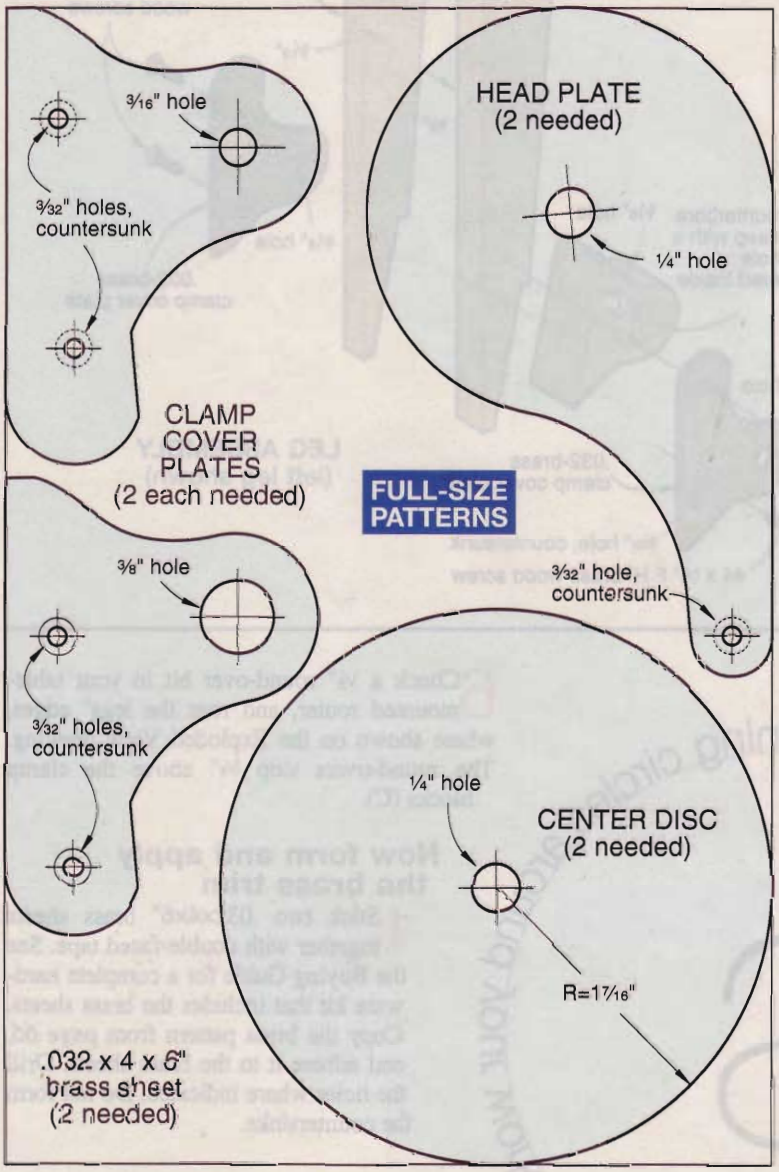
2 Fit your scrollsaw with a 2/0 blade, and cut out the brass parts. File or sand the edges smooth. Countersink the screw holes on the opposite sides of the paired clamp cover plates. Remove the patterns and separate the pieces. To avoid distorting the thin brass, use acetone or lacquer thinner to soften the double-faced tape adhesive. Now countersink the screw holes in the head plates.

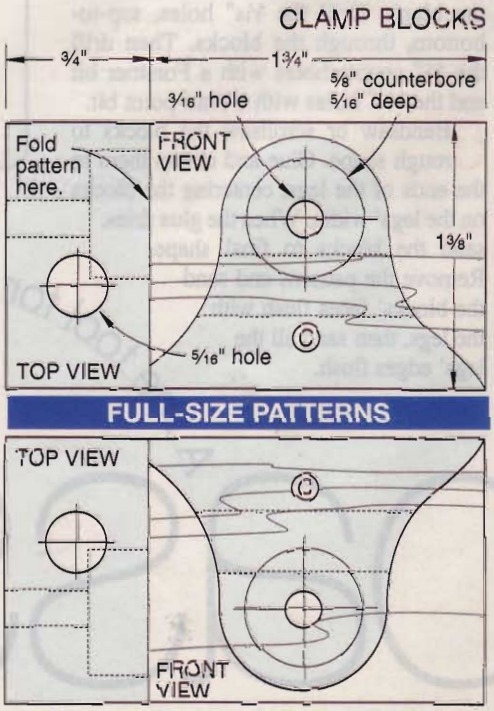
Note: *The clamp cover plates are mirror images, so the countersinks are formed on the pair's opposite sides. The head plates are identical images, so the pair is separated before forming the countersinks.*

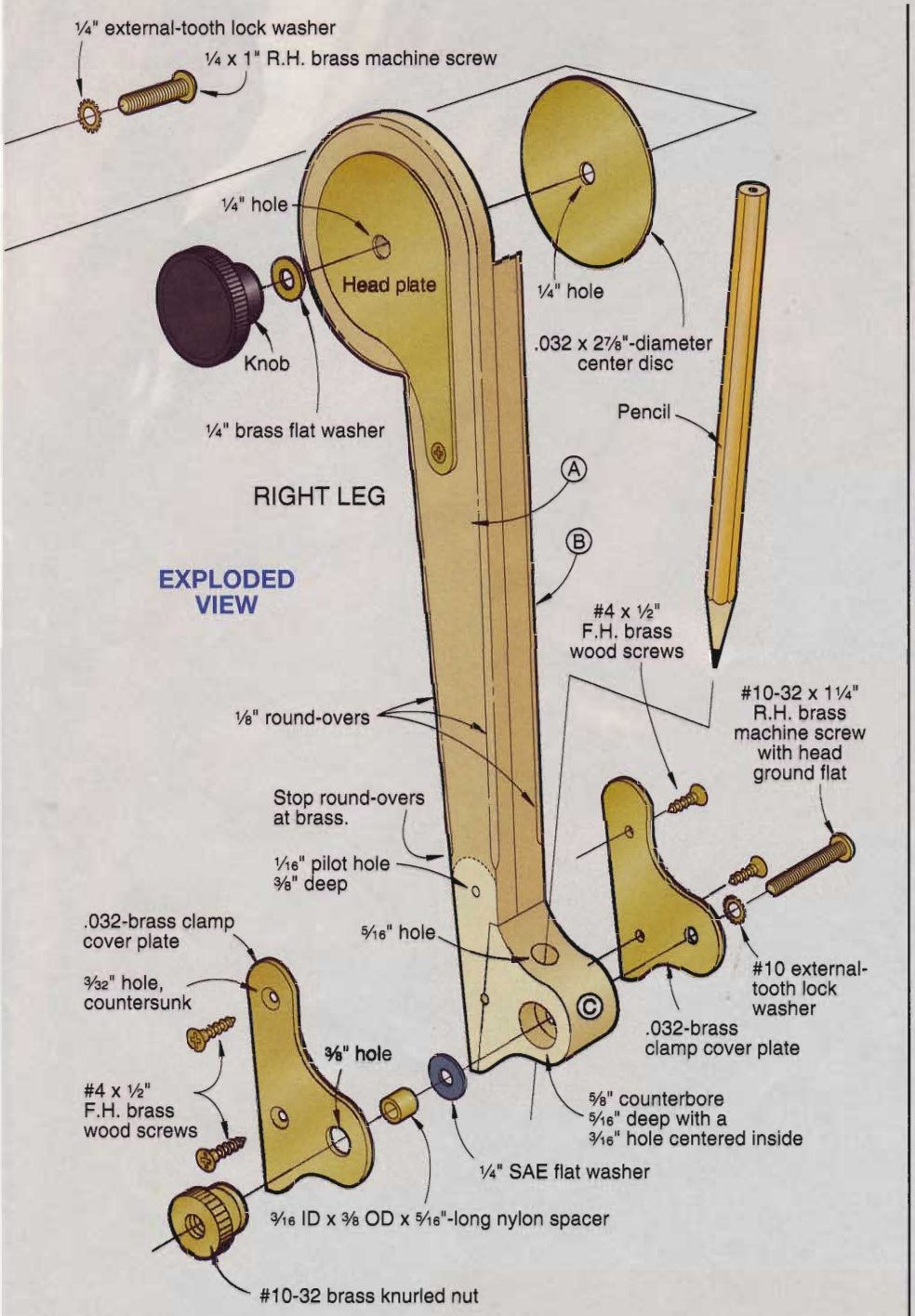
3 Temporarily assemble the head plates to the legs, using ¼" bolts and nuts to align the holes. Using the countersunk screw holes in the plates as

shop tip To avoid twisting off the small brass screws when driving them into their pilot holes, first drive in a steel screw of the same size to establish the threads. Then back out the steel screw, and drive the brass one.









bill of materials

compass

Part	FINISHED SIZE T	W	L	Matl.	Qty.
A* leg halves	5/16"	3"	11"	W	2
B* leg halves	⅜"	1½"	9½"	W	2
C* clamp blocks	¾"	1⅜"	1¾"	W	2

*Parts cut from blanks of the size listed.

Material Key: W–walnut.

Supplies: double-faced tape, epoxy, glue, and finish.

Buying Guide: Hardware kit: .032×4×6" brass sheets (2), #4×¾" brass flathead wood screws (10), ¼-20×1" brass panhead machine screw, ¼" external-tooth lock washer, ¼" brass flat washer, plastic knob with ¼-20 threaded insert, #10-32×1¼" brass roundhead machine screws (2), #10 external-tooth lock washers (2), ¼" steel SAE flat washers (2), 3/16 IDx⅜ ODx5/16"-long nylon spacers (2), #10-32 knurled nuts (2), 1/32" nail set (Stanley no. 58-111). Order kit #COMP-1, $15.95 ppd. from Schlabaugh and Sons Woodworking, 720 14th Street, Kalona, IA 52247, or call 800/346-9663.

guides, drill the pilot holes into the legs. Drive in the screws.

4 Rough up one side of each center disc with 100-grit sandpaper, and spread on a thin coat of epoxy. Position them on the legs, where shown on the Exploded View drawing. Keep the discs aligned, and apply even pressure by snugging the two leg/disc assemblies together with the ¼" brass bolt and knob. To avoid accidentally gluing the parts together, wrap the first ¾" of the bolt with plastic tape, and insert a piece of waxed paper between the center discs.

5 When the epoxy sets, remove the bolt, and separate the legs. Position the clamp cover plates on the clamp blocks, using the machine screws, washers, spacers, and knurled nuts to hold them in place. Insert pencils, align the plates, and tighten the nuts. Using the countersunk screw holes in the plates as guides, drill the pilot holes, then drive the screws. If the profiles of your clamp blocks and cover plates don't align completely, sand them for a perfect match.

Finally, polish, finish, and assemble

1 Remove the clamp cover plates, head plates, and associated hardware. Smooth any edge burrs on the brass plates, and polish them. File down the heads of two #10-32×1¼" brass roundhead machine screws until the screwdriver slot is eliminated.

2 Sand the legs to 320 grit, and finish them with several coats of wiping varnish or oil/varnish blend. We applied two coats of Minwax Antique Oil Finish, sanding lightly with 320-grit sandpaper between coats.

3 To make the compass pivot, grind a point on a 1/32" nail set. We used a Stanley #58-111 because it fits in the same diameter hole as a standard pencil, making the pencil and pivot point interchangeable. Reassemble the compass, as shown on the Exploded View drawing.

Written by **Jan Hale Svec** with **James E. Boelling** and **James R. Downing**
Project design: **James E. Boelling**; **James R. Downing**
Illustrations: **Kim Downing**; **Lorna Johnson**
Photograph: **Stafford Photography**

Left: David Graf turns an oval frame on the elliptical faceplate lathe.

Right: An 18th-century portrait looks at home in a Schwamb-made oval frame.

oval frames of world renown

At Massachusetts' Old Schwamb Mill, woodworkers turn oval frames on an elliptical faceplate lathe that dates to the 19th century.

During the Revolutionary War, British soldiers returning to Boston after clashing with Minutemen passed through what is now Arlington, Massachusetts. But it wouldn't be for another 90 years that the woodworking tradition of the Old Schwamb Mill there would begin.

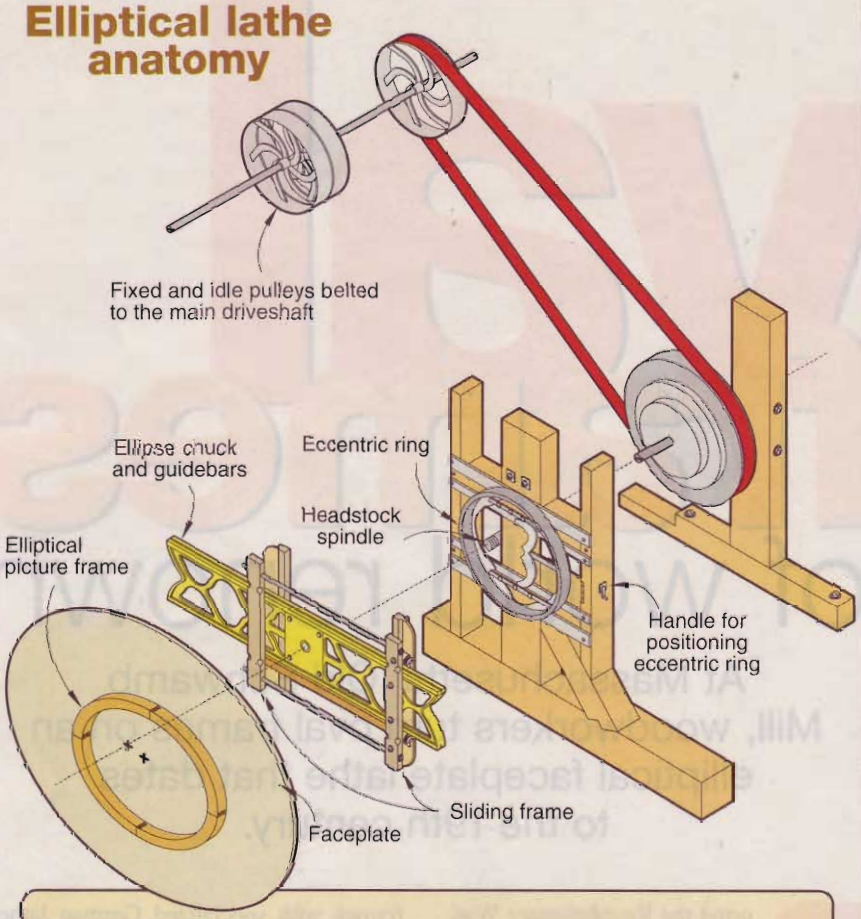
In 1864, Charles Schwamb along with Fredrick, his youngest brother, bought what was then an Arlington spice mill, powered by the rushing water of Mill Brook. Soon after, the brothers installed all of the necessary machinery to convert the old spice mill to woodworking, a trade learned in their native Germany.

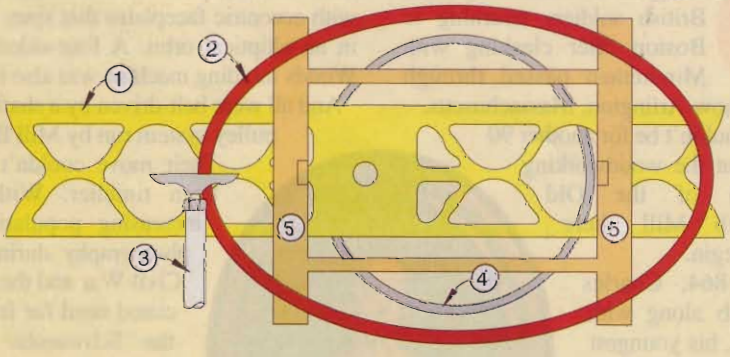
Rather than compete with the makers of chairs, chests, and clocks, the Schwambs produced oval photographic portrait frames with specialized German lathes with eccentric faceplates that spun wood in an elliptical orbit. A four-sided S.A. Woods molding machine was also in use. And all were belt-driven by a shaft-and-pulley system run by Mill Brook.

Their move couldn't have been timelier. With the increasing popularity of photography during the Civil War and the associated need for frames, the Schwambs' mill soon became the nation's leading maker of round and oval mirror and picture frames.

Through the decades, the methods of powering the machineries' shaft-and-pulley system were updated. In 1872 came a steam engine, its drive shaft running through a 40' tunnel to power the mill's machines. The year 1888 brought a water turbine to supplement steam power. Yet, it wasn't until 1954 that elec-

Elliptical lathe anatomy





1. Ellipse chuck and guidebars. The chuck is screwed onto the headstock spindle and then rotates concentrically.

2. Elliptical picture frame. Outline of frame position mounted on lathe faceplate.

3. Tool rest. Each point on the ellipse will pass by the lathe tool on the center of the rest.

4. Eccentric ring. The fixed concentric ring does not rotate because its center is offset from the headstock spindle center. The ring causes the slide to move along the guidebars while the ellipse chuck rotates.

5. Sliding frame. The slide is mounted in tracks on the guidebars. The front of the slide carries a wooden faceplate, to which the picture frame is attached. The slide back bears against the outside of the eccentric ring.

tric motors finally replaced steam and turbine power. The orginal 19th-century shaft-and-pulley belt-drive remained in place, as it still does.

Today, the Old Schwamb Mill can claim to be the longest continuously operating mill site in the Western Hemisphere. And, you'll find Schwamb frames and moldings in every major art museum in the United States, as well as in the large collections of the White House, the Vatican, Buckingham Palace, and the Palace of the Kings of Hawaii.

One oval frame from four parts

A turner at the Old Schwamb Mill begins an oval frame by reading the written order form. It provides the details regarding outside and inside diameter and cross-sectional profile.

Because most frames, whether oval or circular, are comprised of four interlocking quarter sections or quadrants for strength, the first step in the construction is to lay out one of them. If the order conforms to one of the hundreds of templates accumulated since the Civil War, it's an easy task to find the match. If not, a new template is drawn on cardboard with an ellipsograph, a type of trammel that does one-quarter of an ellipse.

After the quadrants are drawn on the wood (basswood for gilded or painted frames, or maple and walnut for naturally finished ones), the worker saws them

Finger-jointed quadrants are glued up, then clamped with flexible steel bands in the glue room.

to rough shape at the bandsaw (an aged Yates-American). The now mating frame quadrants of wood are then ready for the jointing process.

The ends of the quadrants are sawn on a tablesaw with an old wooden sliding table and two positioning jigs. The jigs allow the craftsman to stabilize the curved quadrants so the saw cuts are precise and the ends will mate.

Workers call the finger-joint saw "the groover." As seen *far right*, with a series of blades spaced equidistant from each other and fences on either side, the cuts can go quickly. By holding each quadrant against first one fence then against the other, and sliding it through the blades, the finger joints are sawn so precisely that the pieces fit together like a tight jigsaw puzzle.

In the glue room, *above*, a worker applies glue to the ends, then joins the quadrants. A strap clamp of flexible metal, wrapped tight via a hand wheel, draws the sections together and holds them for a day until the glue dries.

Adjust the lathe for precision turnings

After scraping off any dried glue from the back of the frame blank and jointing it flat for attachment to the faceplate, the turner adjusts the elliptical lathe so it spins in the correct path for the size of oval being created (see illustration *opposite page*). To reduce vibration, the frame blank will be centered on the faceplate and fastened to it from behind with screws.

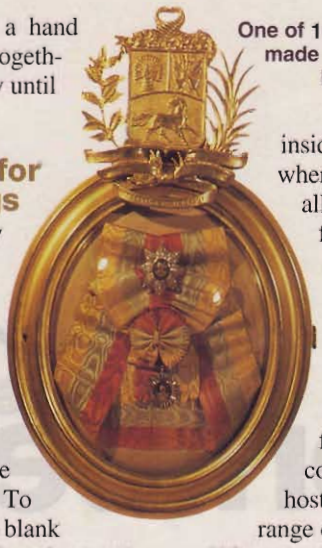
Dimensioning the blank to exact proportions means first truing the face flat and to thickness with a 24" F.H. Clements jointer-planer. Then, mounted on the lathe, the blank slowly turns (under 1,000 rpm) and glue squeeze-out is taken off along with wood.

As the oval frame slowly emerges, the turner switches from one lathe tool to another. (All lathe tools are handmade at the mill from steel bar stock.) A spear-point tool for planing cuts follows the scraper.

It shapes the blank to final thickness, then is used to cut the inside to the ordered dimensions. With the final inside dimension reached, the turner cuts the outside edge.

Then, with a special scraping tool for right angles, the craftsman begins forming the rabbet inside the inner edge. This is where the customer will eventually place the image for the frame. Getting to final depth of this intricate cut takes time because working the rabbeting tool on the inner edge is dangerous due to rabbet depth. Finally, the frame is ready for its profile, which may include coves, ogees, beads, and a host of other shapes, using a range of lathe tools.

When turned, the frame is sanded lightly, then goes upstairs to the finishing room. There, it's either gilded or stained and given a clear finish.



One of 14 gold-leafed display frames made in 1981 for the Palace of the Kings of Hawaii in Honolulu.

Written by Peter J. Stephano
Photographs: Kevin Brusie; finished frames and mill courtesy of the Old Schwamb Mill
Drawings: Roxanne LeMoine, from originals by the Historic American Engineering Record, National Park Service, delineator Mary M. Chrisney, 1977

The old multi-bladed finger-joint saw has wooden fences on both sides. With fine adjustments, it cuts joints that go together like a jigsaw puzzle.

Walk through the mill

Since 1969 the Old Schwamb Mill has been held in an operating trust as a living history museum by the Schwamb Mill Preservation Trust, a nonprofit, charitable and educational organization. The mill was placed on the National Register of Historic Places in 1971.

You can tour the Old Schwamb Mill Mon. through Fri., 10 a.m. to 2 p.m., all year (except legal holidays). You'll find it at 17 Mill Lane, off 29 Lowell St., Arlington, Massachusetts. Call 781/643-0554. Or visit its Web site at www.oldschwambmill.org.

dust-defying side-draft workbench

Powerful airflow conquers dust at the source

One of the most enjoyable parts of designing a woodworking project is helping it evolve from concept through completion. But woodworking evolution, just as in nature, sometimes produces a surprise.

For example, this project actually started as a downdraft sanding table. But when I reviewed my initial design sketches with the other woodworkers around the office, we realized that many readers can't dedicate scarce shop space to a table used strictly for sanding. For many of us, every square foot in the shop is valuable real estate.

So, I changed to a side-draft dust-collection system and beefed up the top, making it more durable. I also added storage, electrical outlets, a metal track system, and a router mat. How's that for a full-featured workbench?

Note: *We usually identify the parts of a project in alphabetical order determined by the sequence in which you'll cut them. But in this project, we lettered the parts in their assembly sequence. It's important that you follow this order of assembly so that you'll have the clearance you'll need to attach clamps and drive screws. To keep the parts organized, use a permanent marker to write the identifying letter on the end of each part.*

Let's start with the carcase

1 Lock your tablesaw's rip fence 30½" from the blade, and rip ¾"-thick medium-density fiberboard (MDF) for the left divider (A), the right divider (D), and the bottom (G). Without moving the fence, rip ¾"-thick birch plywood for the left and right end panels (H, I).

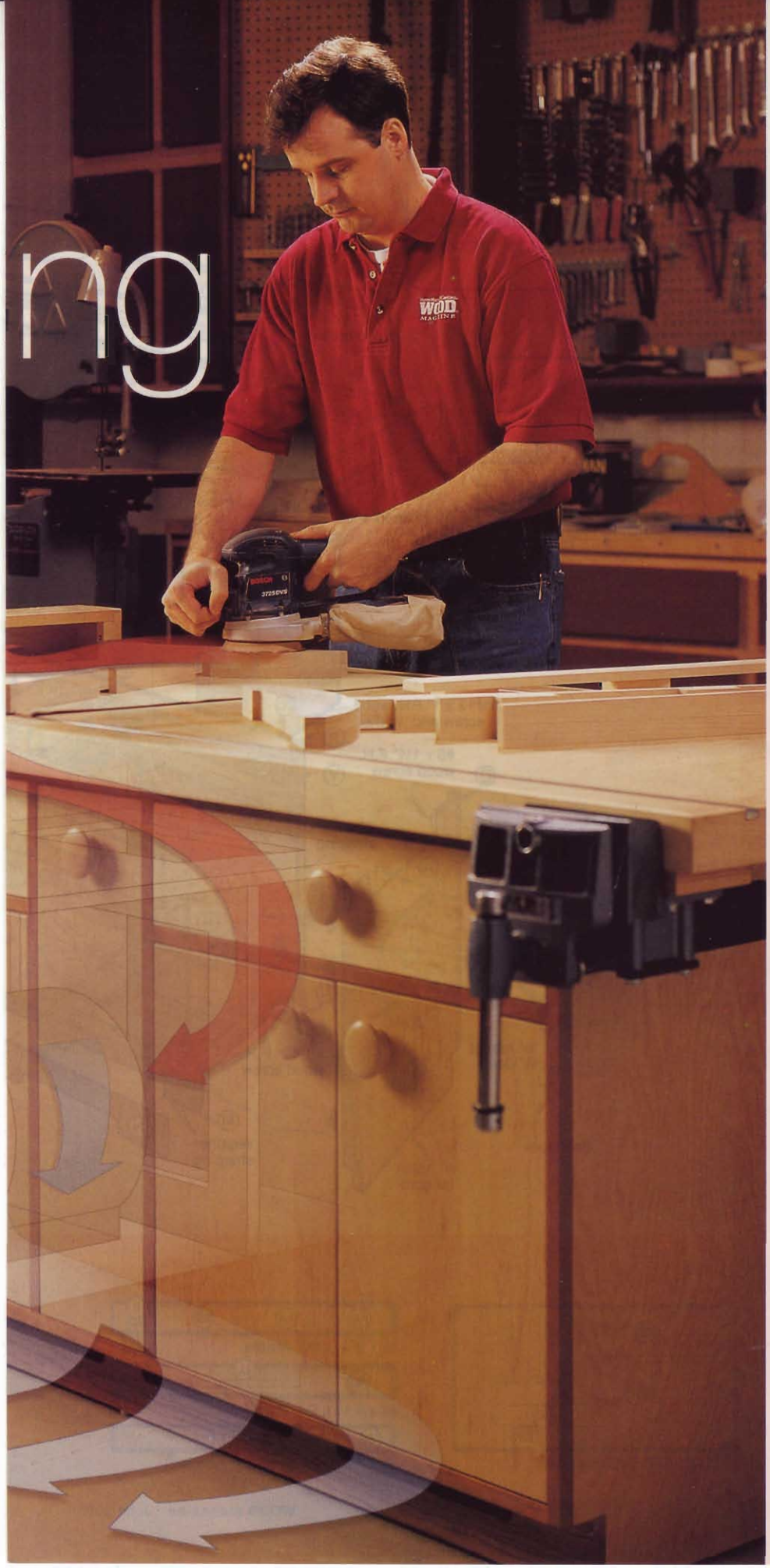
2 Move the rip fence to 26½" from the inner edge of the blade, and rip ¾"-thick MDF for the left and right back (C, F), the right drawer support (E), and the left drawer support (B).

3 Adjust the rip fence, and cut two stretchers (J) and two kickers (K) from MDF. Move it again to cut the outer drawer support (L). Finally, rip a pair of shelves (T) from the same material.

4 Crosscut all of these parts to the lengths shown in the Bill of Materials. In addition to the top stretchers (J), kickers (K), and the shelves (T), there are other pairs of pieces with identical lengths. These are the left and right dividers (A, D),

How this bench puts the hurt on dirt

The heart of the system is a furnace blower with a squirrel-cage fan. When you want to sand a project, raise the side-draft hood at the end of the bench, and switch on the motor. This starts a flow that pulls air and dust across the top of the bench. After the air moves through the hood and an opening in the left drawer support, dust particles hit the furnace filter and stay there. The cleaned air continues through the furnace blower. The forced air then exhausts through a hole in the bottom, moving through the vents cut in the base. With the hood lowered for an unobstructed work surface, you can leave the fan running to remove dust from your shop's air, just like a typical air-filtration system.



the left and right end panels (H, I), the right and left backs (C, F), and left and right drawer supports (B, E).

Cut dadoes and a rabbet

1 Put a ¾"-wide dado set in your tablesaw, and raise it for a ¼"-deep cut. Make a test cut in scrap stock to make certain that the dado's width matches the thickness of your MDF. Check that the test dado's depth is exactly ¼" deep.

2 Referring to the Parts View drawings, adjust your rip fence to cut the lower horizontal dado in the right and left end panels (H, I). Move the rip fence, then cut the upper horizontal dadoes in H and I. Move the fence again, and make the horizontal dado in the left and right dividers (A, D). Set the fence to cut the dadoes in the left and right drawer supports (B, E).

3 Cut the vertical dadoes in the right divider (D) and the right end panel (I). Move the rip fence, then cut the vertical dadoes in the left divider (A) and the left end panel (H).

4 Referring to the Parts View drawings, lay out the location of the dadoes on the bottom (G). Referring to the Parts View drawings, lay out the location of the dadoes on the stretchers (J). The stretchers are longer than the bottom, but the dadoes in both parts (G, J) must produce an 8½" space centered end-to-end. Cut these dadoes. The dado in each kicker (K) is centered in its width.

5 Raise the dado blade ½" above the saw's table. Attach a 6"-high scrapwood face to your rip fence, then lock the fence in position with the scrapwood face just touching the edge of the dado blade. Make a test cut in scrap stock to check the setup. Cut the rabbets along the top edge of the left and right end panels (H, I). Leave the scrapwood face on the fence because you'll need it for several other cuts later.

Create the cutouts in the carcase

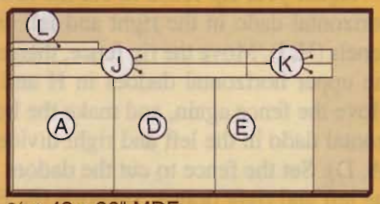
1 Use a pencil and framing square to lay out the cutout in the bottom (G). Drill a ½" hole to create an entry hole for your jigsaw's blade, and cut the rectangular opening. Drill the hole for the power cord next to this opening, then set this part aside for the time being.

2 Chuck a 1" bit into your drill, and bore the hole in the left drawer support (B). Following the same procedure you just used on the bottom, mark and cut

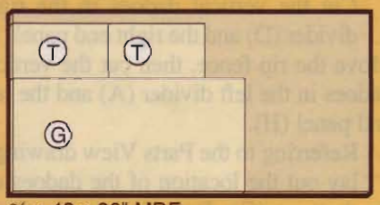
the opening in this part, then set it aside. Repeat the process for the hole in the left back (C), and set it aside.

3 Clamp a scrapwood block along the bottom edge of the left end panel (H), and lay out the location of the ½" notch, where shown on the Parts View drawing. Position the tip of the 1" bit in the scrapwood/panel seam, then drill the semicircular notch. Cut the large notch and switch-box hole in the upper end of part H. Complete this panel by marking and cutting the toekick notches in the bottom

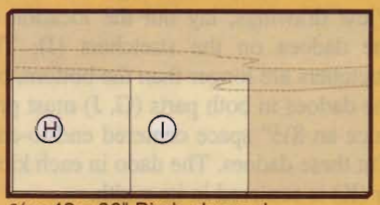
cutting diagram



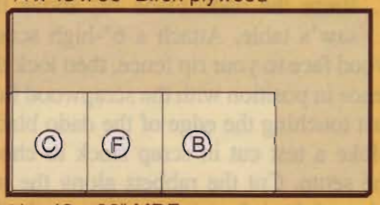
¾ x 48 x 96" MDF



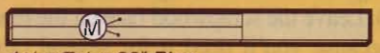
¾ x 48 x 96" MDF



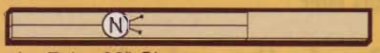
¾ x 48 x 96" Birch plywood



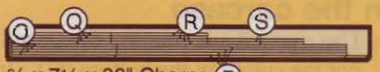
¾ x 48 x 96" MDF



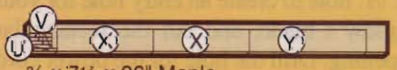
1½ x 7¼ x 96" Pine



¾ x 7¼ x 96" Cherry



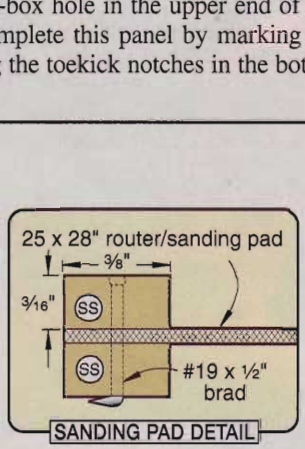
¾ x 7¼ x 96" Cherry P



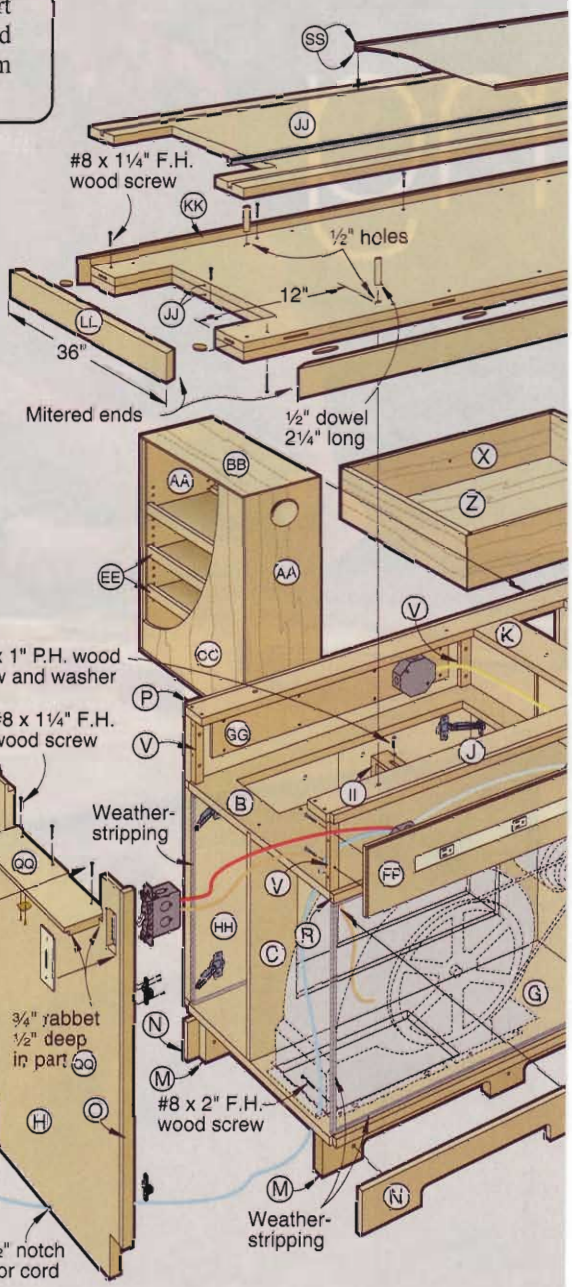
¾ x 7¼ x 96" Maple

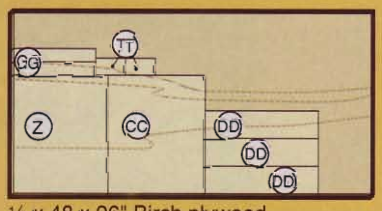
¾ x 7¼ x 96" Maple

*Plane or resaw to thickness listed in the Bill of Materials.

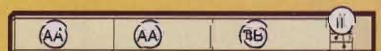


EXPLODED VIEW

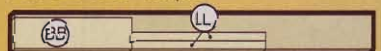




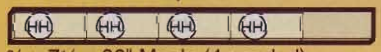
½ x 48 x 96" Birch plywood



¾ x 9¼ x 96" Maple



¾ x 9 ¼ x 96" Maple



¾ x 7¼ x 96" Maple (4 needed)

bill of materials

side-draft workbench

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A	left divider	¾"	30½"	27¼"	MDF	1
B	left drawer support	¾"	26½"	30½"	MDF	1
C	left back	¾"	26½"	20¼"	MDF	1
D	right divider	¾"	30½"	27¼"	MDF	1
E	right drawer support	¾"	26½"	30½"	MDF	1
F	right back	¾"	26½"	20¼"	MDF	1
G	bottom	¾"	30½"	62½"	MDF	1
H	left end panel	¾"	30½"	31¾"	BP	1
I	right end panel	¾"	30½"	31¾"	BP	1
J	stretchers	¾"	3¾"	63"	MDF	2
K	kickers	¾"	3¾"	23"	MDF	2
L	outer drawer support	¾"	2"	23"	MDF	1
M	sub-bases	1½"	3½"	62"	P	2
N	bases	¾"	3½"	63½"	C	2
O	end panel bands	¾"	¾"	28¼"	C	4
P	top/bottom bands	¾"	¾"	62"	C	4
Q	center bands	¾"	¾"	26¾"	C	4
R	rail bands	¾"	¾"	26"	C	4
S	shelf bands	¾"	¾"	25⅞"	C	2
T	shelves	¾"	14¾"	25⅞"	MDF	2
U	doorstop	¾"	¾"	3¾"	M	1
V	false drawer cleats	¾"	1"	6"	M	4
W	laminate strips	1/16"	1"	30½"	PL	16
X	drawer front/back	¾"	5⅞"	25⅞"	M	2
Y	drawer sides	¾"	5⅞"	31½"	M	2
Z	drawer bottom	½"	31½"	25⅜"	BP	1
AA	pull-out front/back	¾"	8⅜"	26⅝"	M	2
BB	pull-out top/bottom	¾"	8⅜"	31½"	M	2
CC	pull-out side	½"	31½"	26⅛"	BP	1
DD	pull-out shelves	½"	7⅛"	30⅝"	BP	3
EE	pull-out shelf edges	½"	1½"	30⅝"	M	6
FF	drawer false fronts	¾"	6"	26"	M	2
GG	backers	½"	3½"	22"	BP	2
HH	doors	¾"	12⅞"	19⅜"	EM	8
II*	filter-holding block	1½"	2¼"	6"	M	1

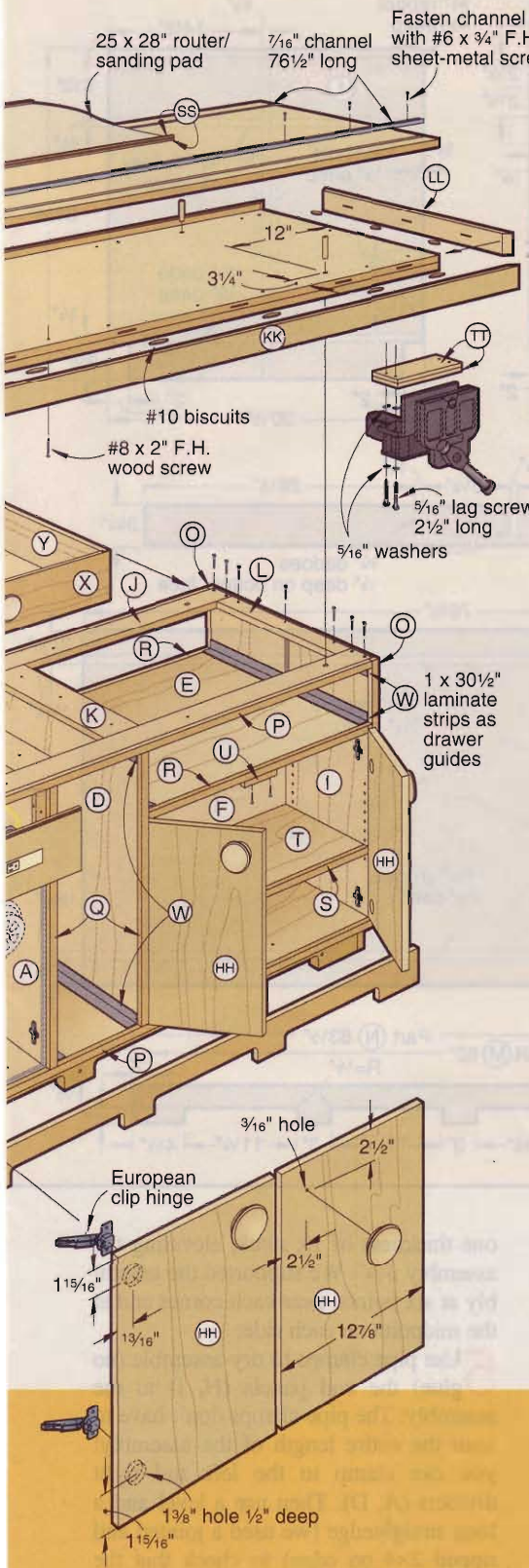
Part		FINISHED SIZE T	W	L	Matl.	Qty.
JJ	top	¾"	34½"	76½"	MDF	3
KK	edge bands	¾"	2¼"	78"	M	2
LL	end bands	¾"	2¼"	36"	M	2
MM	hood top	¾"	4¾"	22⅝"	M	1
NN	hood back	¾"	9½"	22⅝"	M	1
OO	hood bottom	¾"	2¼"	21⅞"	M	1
PP	hood sides	¾"	4¾"	9½"	M	2
QQ	hood bracket	¾"	3¼"	21⅞"	M	1
RR	stop blocks	¾"	¾"	5"	M	2
SS	sanding-mat strips	3/16"	⅜"	25"	C	4
TT	spacers for vise	½"	4½"	8"	BP	2

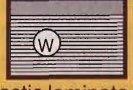
*Laminate from two pieces of ¾" stock.

Materials Key: MDF–medium-density fiberboard, BP–birch plywood, P–pine, C–cherry, M–maple, EM–Edge-glued maple, PL–plastic laminate.

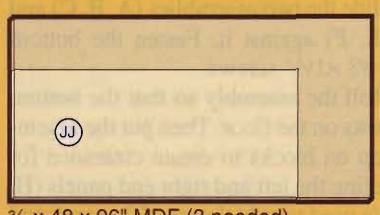
Supplies: Items listed in the Buying Guide plus #10 plate-joiner biscuits; ⅝" brads; #8x1" flathead wood screws; #8x1¼" flathead wood screws; #8x1½" flathead wood screws; #8x2" flathead wood screws; #6x½" panhead sheet-metal screws; #6x¾" flathead sheet-metal screws; #6x1¼" flathead sheet-metal screws; #12x1" panhead wood screws; #12x1¼" sheet-metal screws; 24" length of ½"-dia. dowel rod; orange and yellow wire nuts; #19x½" brads; six-outlet, 36"-long surface metal power strip (we used Wiremold brand); 2½" wood mushroom knobs (12); 25' 12-gauge power cord; 20x25" furnace filters (2); octagonal junction boxes with plain cover plates (3); single-gang switch box; 15-amp single-pole switch; switch plate; electrical staples; clamp connectors (8); router/sanding pad (we used Porter-Cable model 39993); sash lock; wood and foam doorjamb weatherstrip; ¼" bracket-style shelf supports (20); 10' pieces of galvanized mini-channel B-Line brand model B-72 or equivalent (2) (available from your local electrical-supply house).

Buying Guide: Wilton 78A woodworking vise, item 126504, $114.99 plus shipping from Woodcraft Supply, 560 Airport Industrial Park, P.O. Box 1686, Parkersburg, WV 26102, 800/225-1153, or visit www.woodcraft.com. Blum 35mm European clip hinges, 125° inset, item 02S70, $10.99 per pair plus shipping (workbench requires 8 pair), also from Woodcraft Supply. Blower unit no. 4TL99-0, $155.59 (wholesale) from W.W. Grainger, Inc. For the location of a branch near you, call 847/647-8900 or visit www.grainger.com. Grainger sells to businesses only, so you may have to order through a heating or electrical contractor.

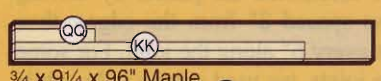




1/16 x 20 x 31½" Plastic laminate



¾ x 48 x 96" MDF (3 needed)



¾ x 9¼ x 96" Maple

¾ x 11¼ x 96" Maple

⅜ x 3½ x 48" Cherry

corners. Cut identical toekick notches in the right end panel (I).

A jig makes it easy to drill the shelf-pin holes

1 Make a jig for drilling opposing identically located shelf-pin holes by cutting a ¾"-thick piece of scrapwood to 3½×18". Referring to the Parts View drawing for the right divider (D), lay out the centerpoints of one vertical column of shelf-pin holes on the scrapwood. Then use your drill press to create the jig by accurately drilling the holes through the piece of scrap.

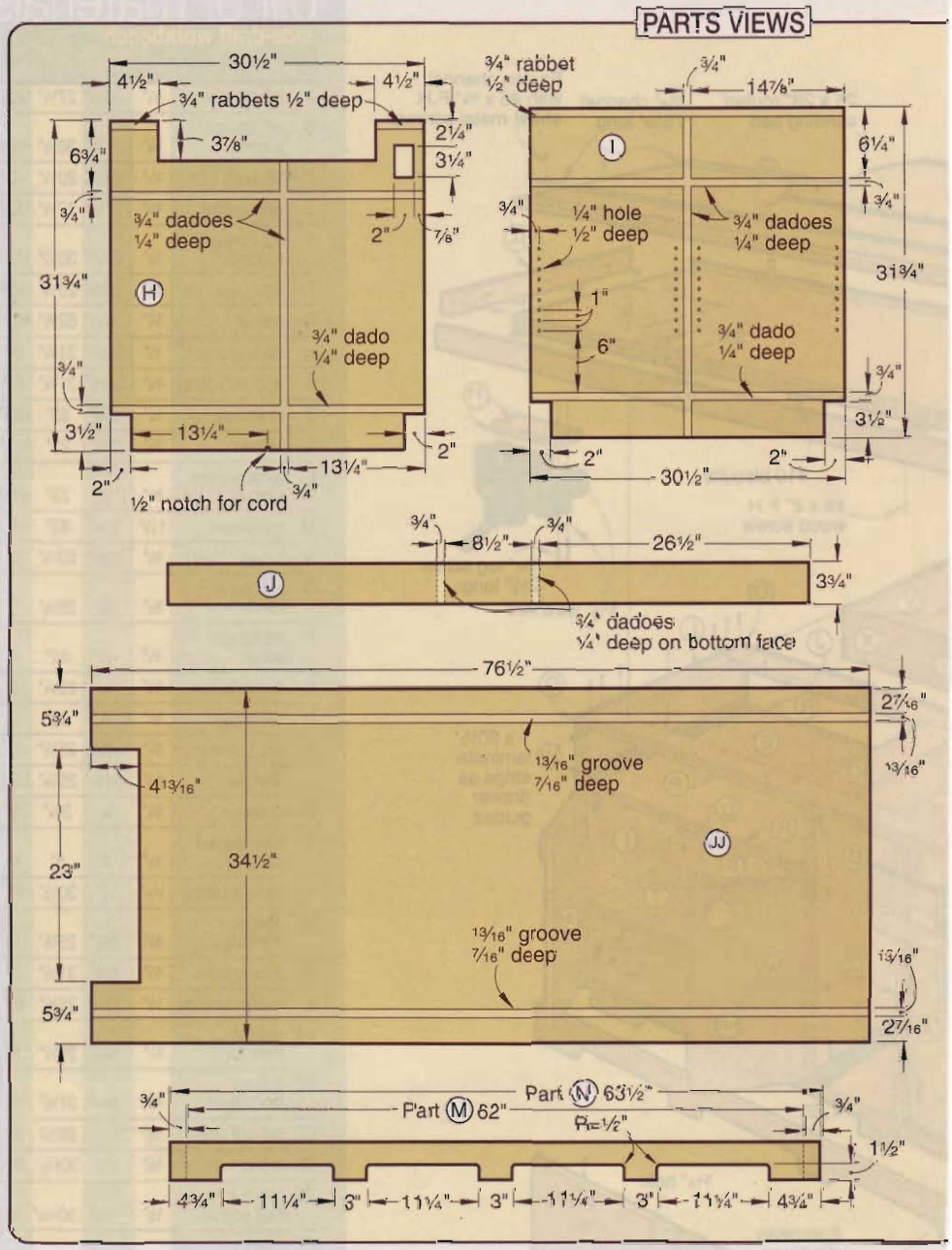
2 To use the jig, clamp it to the right center divider (D), making certain that the jig's edge is flush with that of the panel, and that the jig's bottom end is flush with the panel's lower end. Use a stop collar on the bit in the your handheld drill so you don't drill too deep (masking tape works, too). It would be difficult to clamp the jig in position for the holes near the center of this part, but fortunately there's an easy solution. Simply slide a scrap strip of MDF into the vertical dado. Then hold the jig against the strip while you drill the holes.

3 Before you use the jig to drill the holes in the right end panel (I), you need to cut ¼" of length from the jig's bottom end. This cut is needed because the bottom ¼" of part D is housed in a dado. Register the jig's end against an MDF strip in the lower horizontal dado, and hold the jig's edge flush panel's edge to drill the outer columns of holes.

Let's put the carcase together

1 When you work with MDF, you must pre-drill for screws to avoid splitting the panel's edges and ends. The #8 flathead wood screws we used require a 5/32" shank hole, a 7/64" pilot hole, and a countersink. Although you can drill all of these components with separate bits, you'll speed your work by using a combination bit.

We assembled the panels by driving screws spaced 2" from the edges, then about every 6" along the joint. For some of the joints, we used screws only, while others required both glue and screws. But attaching the end panels (H, I) was an operation that used glue only. Read along, and we'll tell you the method we used for each joint.

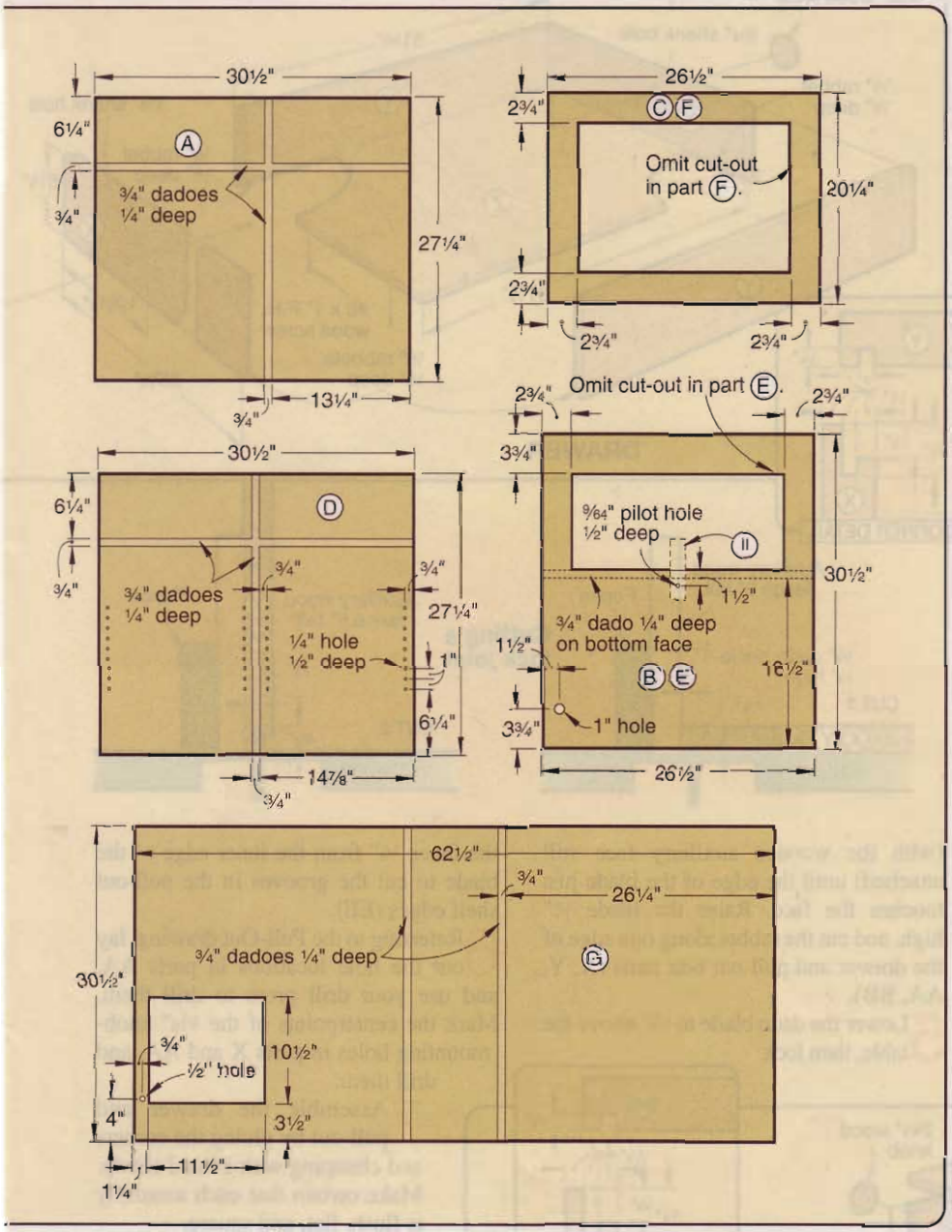


2 Using #8×1½" flathead wood screws, attach the left divider (A) to the left drawer support (B), then add the left back (C) to the assembly. Make certain that all edges are flush. Assemble the right divider (D), the right drawer support (E), and the right back (F), in the same way.

3 Hold the bottom (G) on edge, and slide the two assemblies (A, B, C) and (D, E, F) against it. Fasten the bottom with #8 ×1½" screws.

4 Roll the assembly so that the bottom rests on the floor. Then put the assembly up on blocks to create clearance for installing the left and right end panels (H, I). We used two thickness of 2× stock and one thickness of 1× stock, elevating the assembly 3¾". We supported the assembly at six points: near each corner and at the midpoint on each side.

5 Use pipe clamps to dry-assemble (no glue) the end panels (H, I) to the assembly. The pipe clamps don't have to span the entire length of the assembly; you can clamp to the left and right dividers (A, D). Then use a level and a long straightedge (we used a jointed and ripped 2×4 on edge) to check that the assembly is level along its length and side to side. Make any necessary adjustments by tapping tapered shims between the bottom of the assembly and the blocks.



6 Glue and clamp the end panels (H, I) in place, then glue and screw the stretchers (J) into position. Also glue and screw the kickers (K) and outer drawer support (L) into position. Double-check that the assembly is level and square, and let the glue dry, preferably overnight.

Add the workbench base

1 Unclamp the carcase, and turn it upside down. This assembly weighs quite a bit, so the easiest way to this is by placing some old blankets or carpet scraps on the floor and rolling the assembly onto its back, then upside down. Use shims under the carcase to level it.

2 Double check the length of the sub-base (M) and the base (N) against your carcase, then cut these parts to size. Referring to the Parts View drawing, lay out the notch pattern where shown on the base (N). Using glue and #8×2" flathead wood screws, attach the sub-base (M) to the base (N). Be certain that your screws avoid the areas that will be removed. Using a bandsaw or jig saw, cut the notches, then sand the edges with 100-grit sandpaper.

3 Fasten these sub-base/base assemblies to the carcase with glue and #8×2" flathead wood screws driven through the bottom (G).

Add edging strips to the carcase

1 To conceal the edges of the plywood ends and the MDF carcase, you'll apply hardwood edge banding. Rip enough cherry into ¾×¾" strips for the bands (O, P, Q, R, S).

2 To ensure that you get a perfect fit, gauge each piece against the carcase, then cut it to length. Work through the pieces in alphabetical order, gluing and clamping them to the carcase.

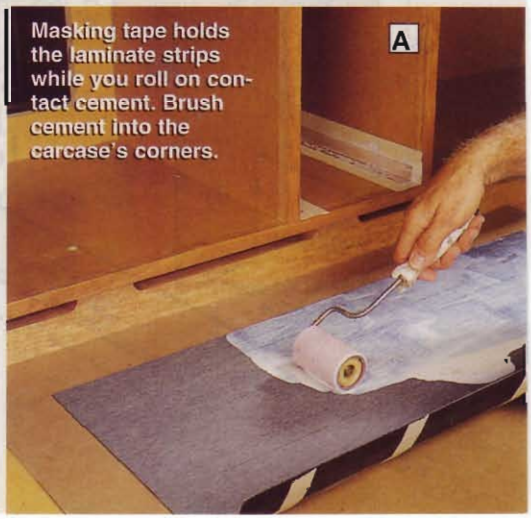
3 Remove the clamps after the glue dries and sand the bands flush with the panels, using 100-grit sandpaper and a sanding block.

4 Cut the doorstops (U) and false drawer cleats (V) from ¾"-thick maple. Screw doorstops to the bottom side of the right drawer support (E) as shown on the Exploded View drawing. Center the doorstops side to side and ¾" back from the banded face of the carcase. Referring to the Exploded View drawing, screw the false drawer cleats (V) to the left divider (A) and the left end panel (H).

Finish before you're finished

1 The best time to apply finish to the interior of the carcase is now. We used two coats of water-borne polyurethane. But before you brush it on, mask the corners that receive the laminate strips (W). These pieces serve as friction-reducing drawer glides, and will be added later.

2 Use your tablesaw to cut a piece of plastic laminate 30½" long. Then slice it into 1"-wide strips. Place the strips face down on your workbench. Butt the strips tightly together and join them with several strips of masking tape. Turn the strip assembly right side up, and roll on contact cement (we used a water-borne variety) as shown in the **Photo A**.


A

Masking tape holds the laminate strips while you roll on contact cement. Brush cement into the carcase's corners.

3 Remove the masking tape from the carcase and brush on a coat of contact cement. Following label directions, adhere the laminate strips where shown.

Make the drawer and pull-out next

1 From ¾"-thick maple, rip and crosscut the drawer front/back (X), the drawer sides (Y), the pull-out front/back (AA), the pull-out top/bottom (BB), and the pull-out shelf edges (EE). Double-check the size of both sets of front/backs (X, AA) against the opening. These parts are designed to show a 1/16" reveal around their perimeter, so their overall dimensions are ⅛" smaller than the opening.

2 To make the lock joint for the corners of the drawer and the pull-out, put a ¼" dado blade in your tablesaw. If you removed the 6"-high auxiliary face from your tablesaw's rip fence, replace it now and position the fence ¼" from the inner edge of the blade. Referring to the Corner Detail drawing and Cut 1 of the Cutting a Lock Joint drawing, raise the dado blade ¼" high, and make this cut in the drawer and pull-out box pieces you made (X, Y, AA, BB). Set parts Y and BB aside.

3 Referring to Cut 2 of the same drawing, raise the dado blade ¾" high, and make this cut into parts X and AA.

4 Put a ½" dado blade into your tablesaw, and move the tablesaw fence (with the wooden auxiliary face still attached) until the edge of the blade just touches the face. Raise the blade ½" high, and cut the rabbet along one edge of the drawer and pull-out box parts (X, Y, AA, BB).

5 Lower the dado blade to ¼" above the table, then lock the fence ⅛" from the inner edge of the blade to cut the grooves in the pull-out shelf edges (EE).

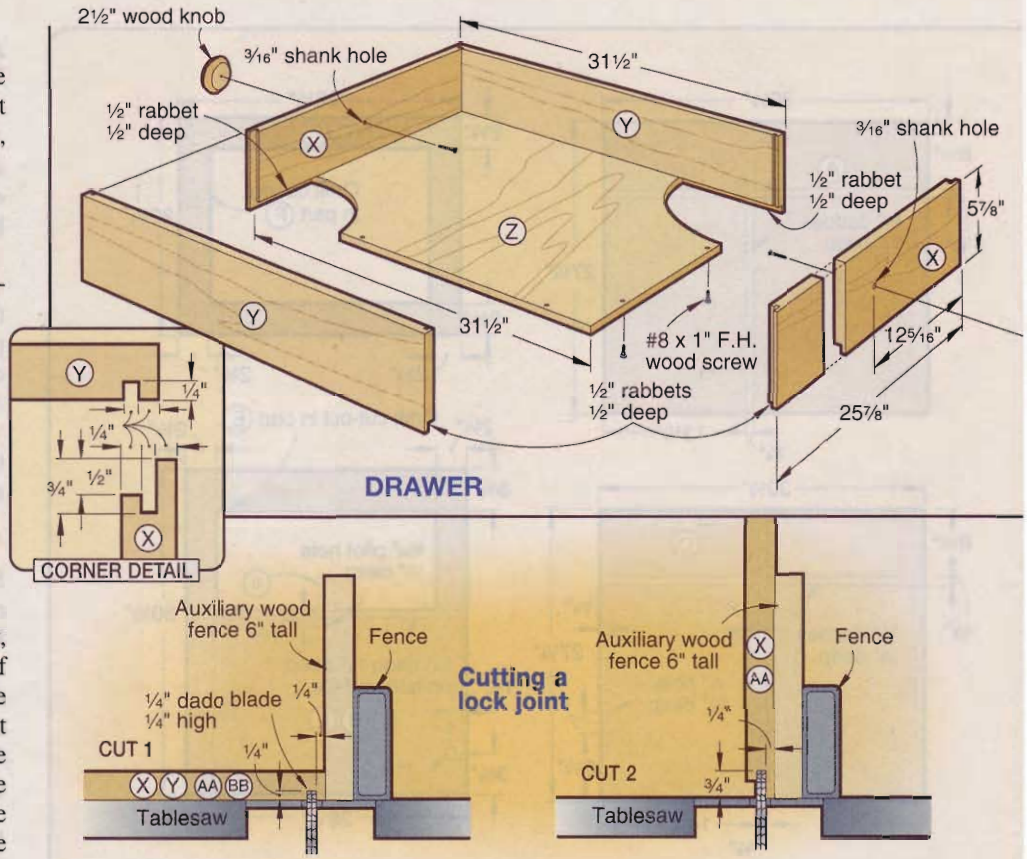
6 Referring to the Pull-Out drawing, lay out the hole locations in parts AA, and use your drill press to drill them. Mark the centerpoints of the 3/16" knob-mounting holes in parts X and AA, and drill them.

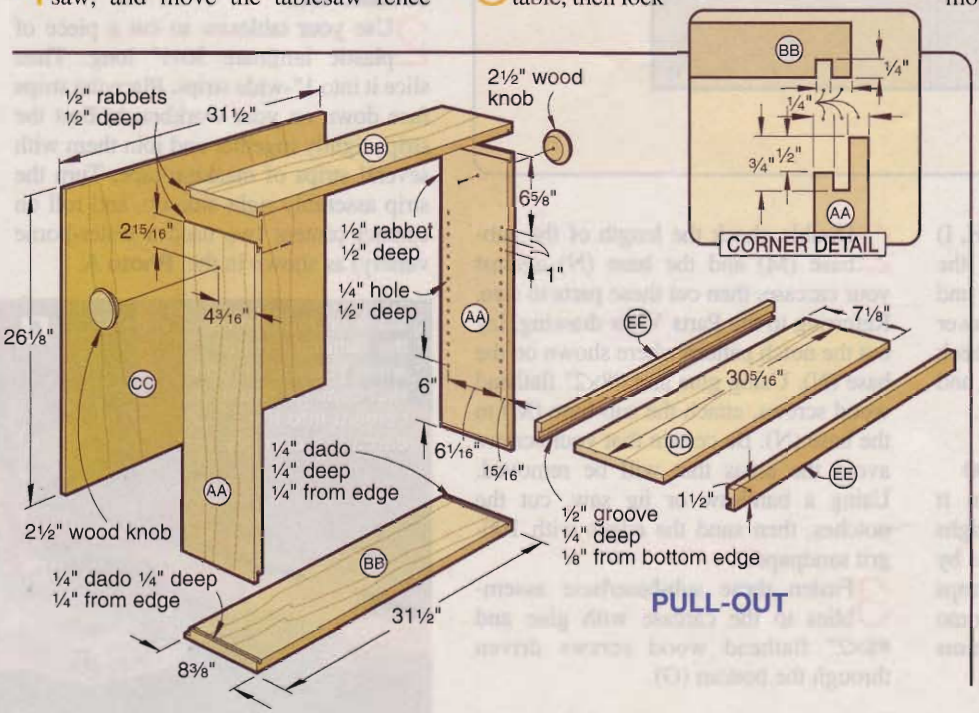
7 Assemble the drawer and pull-out by gluing the corners and clamping with a band clamp. Make certain that each assembly is flush, flat, and square.

8 From ½"-thick birch plywood, cut the drawer bottom (Z), the pull-out side (CC), and the pull-out shelves (DD). Attach the drawer bottom (Z) with #8×1" flathead wood screws. Attach the pull-out side (CC) with glue only. Glue and clamp the pull-out shelf edges (EE) to the pull-out shelves (DD).

Add the power strips

1 Referring to the Bill of Materials, cut the backers (GG) from ½"-thick birch plywood. Cut the drawer false fronts





(FF) from ¾"-thick maple. You'll note that these parts are sized for a snug fit into their openings.

You simulate a reveal around their perimeter by cutting a 1/16" rabbet ¼" deep. You can cut this rabbet with your tablesaw's regular blade. To do that, lower the blade below the surface of the table and move the scrapwood face attached to your rip fence above the blade. Turn on the motor, and slowly raise the blade into the edge of the scrapwood face. Make any adjustments necessary, and cut the rabbets.

2 Take the 36" power strip you purchased, and hacksaw it in half. Screw wire nuts onto the cut wires, and wrap them with electrical tape for extra security. Referring to the Power Strip drawing, screw the mounting bracket to the backer (GG), then drill the ½" hole through the backer.

3 Make the cutout in each drawer false front (FF), and rout the round-over along its perimeter. Guiding the wires through the hole, snap the power strip to its mounting bracket. Screw the backer (GG) to the drawer false front (FF).

You're ready for wiring

IMPORTANT SAFETY NOTE: The wiring of this project is not difficult, but if you have even the slightest concern about your ability to safely complete it, call a licensed electrician to do the wiring for you.

1 Purchase three 4" octagonal junction boxes with plain covers. Remove a knockout from the back of each box, and screw them to the backers (GG), where shown on the Wiring Diagram drawing. Remove knockouts from the sides of the junction boxes where shown and install the clamp connectors. Screw the backer/drawer false front assemblies (GG, FF) to the carcase.

2 To wire this project, we purchased a 25', 12-gauge power cord with ground. Cut off the plug, then cut an 8' length of wire from the cord. You'll cut this length into shorter pieces to run between the components in the bench.

3 Attach a length of wire to the blower motor, then place the blower unit in place. Drill pilot holes into the bottom (G), and screw the unit into place with #12×1¼" sheet-metal screws through the rubber grommets in the base. Install a switch box into the hole in the left end panel (H).

4 Make all the connections shown in the Wiring Diagram drawing. Secure each connection with a wire nut and electrical tape. Double-check your work, then install the cover plates. Plug in the cord to make sure everything works properly.

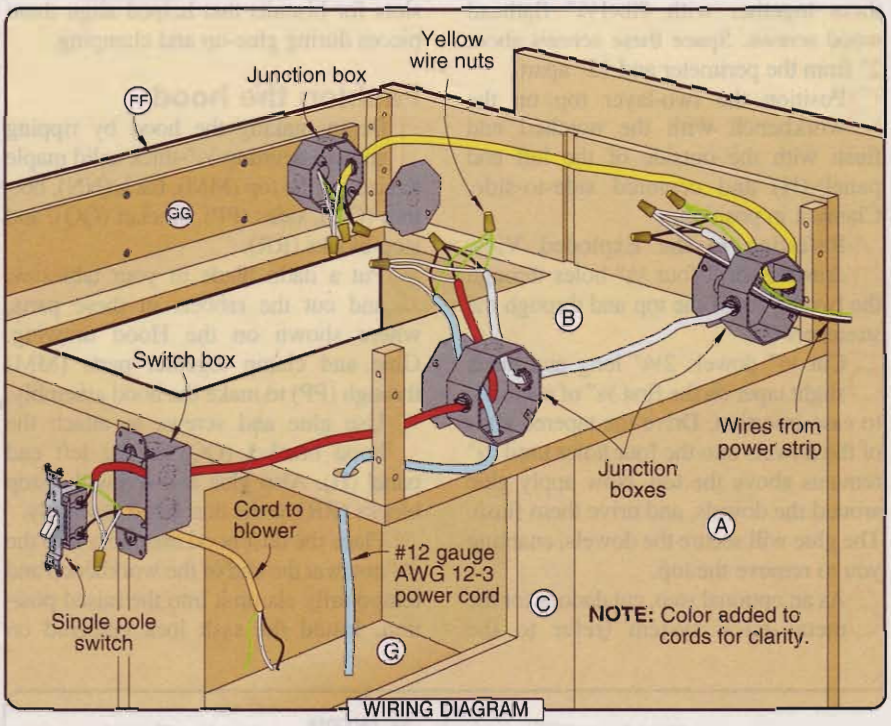
Install doors and filters

1 Edge-glue ¾"-thick solid maple into blanks for the doors (HH). Then, rip and crosscut these parts to size, keeping in mind that there is a 1/16" clearance gap around the door opening and where two doors meet. Round over the outer perimeter of each door with a 1/16" round-over bit or by sanding.

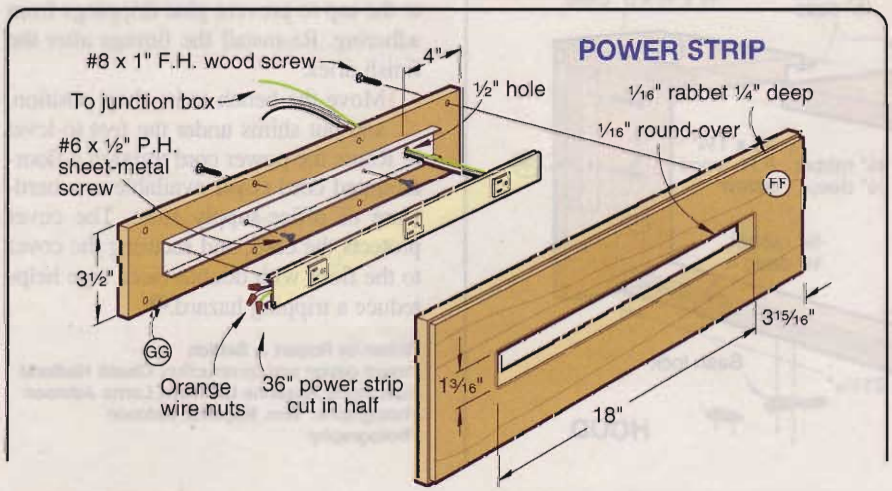
2 Drill the 3/16" holes for the knobs and the 1⅜" holes for the hinges, where shown on the Exploded View drawing. The measurements shown are for the exact hinges listed in the Buying Guide, and other hinges may require different dimensions. Follow the installation instructions supplied with the hinges to mount the doors.

3 Referring to the Filter-Holding Block drawing on the *next page*, make this part (II). Screw it into position, and install the furnace filters.

4 Use ⅝" brads to install the weatherstripping around the perimeter of the doors that conceal the blower motor.



WIRING DIAGRAM



Position the weatherstripping ¾" back from the banded face of the carcase.

Add the top to the bench

1 The top (JJ) consists of three pieces of MDF. Here's an easy way to make certain that all three parts are identical. Carefully cut one piece, including the notch, to the dimensions shown on the Exploded View drawing. This will be your pattern. Then cut two blanks that are ½" oversized in both length and width. Center the pattern on top of one of the blanks and clamp the parts. Use a flush-cutting bit in your router to clone the pattern. Repeat for the other blank.

2 Set one of the tops aside. Carefully align the other two tops, then screw them together with #8×1¼" flathead wood screws. Space these screws about 2" from the perimeter and 12" apart.

3 Position the two-layer top on the workbench with the notched end flush with the outside of the left end panel (H) and centered side-to-side. Clamp it in position.

4 Referring to the Exploded View drawing, drill four ½" holes through the two layers of the top and through the stretchers (J).

5 Cut ½" dowels 2¼" long and put a slight taper on the first ⅜" of each one to ease insertion. Drive the tapered ends of the dowels into the four holes until ¾" remains above the top. Now apply glue around the dowels, and drive them flush. The glue will secure the dowels, enabling you to remove the top.

6 As an optional step, cut dadoes for the metal track system (refer to the Buying Guide) for anchoring hold-downs and an accessory router/sanding pad. Secure these tracks by drilling and countersinking holes for #6×¾" flathead sheet-metal screws. Drill the first holes 2¼" from each end, then every 6". Add the final top piece. Carefully align the edges and ends and clamp them. Drill pilot holes from the bottom of the top assembly, then screw the layers together with #8×2" flathead wood screws. Space these screws about 1" from the perimeter and 12" apart.

7 Cut and add the edge bands (KK) and one of the end bands (LL). Do not install the end band that spans the notch at the end of the bench. You'll add that piece after installing the dust-hood assembly. We used a biscuit joiner to cut slots for biscuits that helped align these pieces during glue-up and clamping.

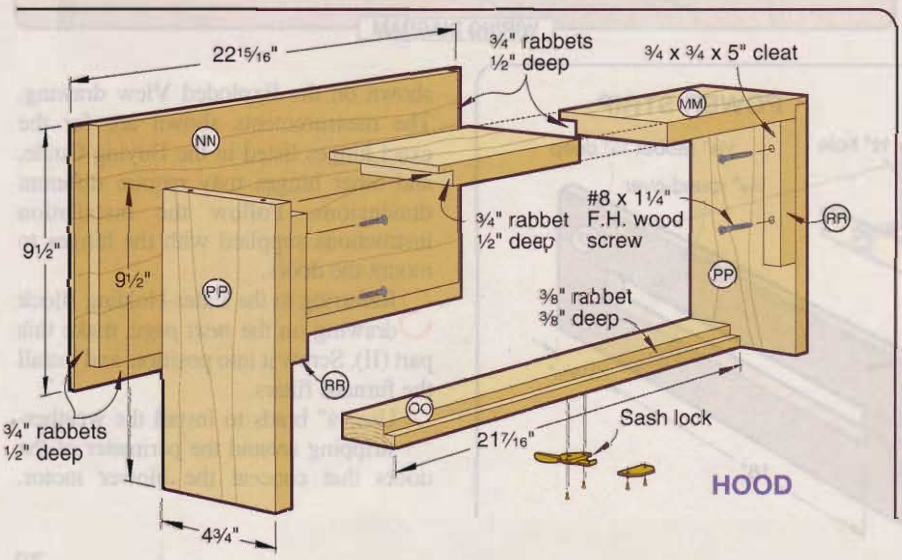
Fashion the hood

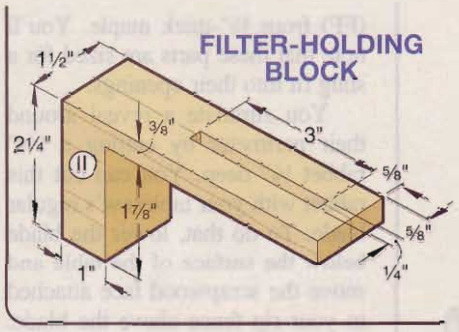
1 Begin making the hood by ripping and crosscutting ¾"-thick solid maple to size for the top (MM), back (NN), bottom (OO), sides (PP), bracket (QQ), and stop blocks (RR).

2 Put a dado blade in your tablesaw, and cut the rabbets in these parts, where shown on the Hood drawing. Glue and clamp together parts (MM) through (PP) to make the hood assembly.

3 Use glue and screws to attach the hood bracket (QQ) to the left end panel (H). Also glue and screw the stop blocks (RR) to the dust hood assembly.

4 Place the dust hood assembly into the notch at the end of the workbench and temporarily clamp it into the raised position. Install the sash lock centered on parts OO and QQ, where shown on the Exploded View drawing. Glue and clamp the end band (LL) into position.





Make some helpful accessories

1 To make the router/sanding pad, we cut four sanding-mat strips (SS) of solid cherry. Then we attached a pair of these strips at opposing ends of a rubber mat with polyurethane glue and ½" brads. Placing the strips on a piece of scrapwood, drive the brads thorough the strips, then turn the assembly over to clinch the tips of the brads into the strips.

To use the pad, put one end into one of the metal channels and slightly stretch the mat to put the other end into the other channel. This slight tension keeps the mat in place.

2 If you want to install the vise listed in the Buying Guide, you'll need to cut spacers (TT) to the size listed in the Bill of Materials. We used 1½" brads in the corners to hold the spacers in position, then drilled pilot holes for the lag screws.

Final steps

1 After removing the hardware, we applied two coats of water-borne polyurethane to the exterior of the workbench. We applied two coats of oil finish to the top to prevent glue drippings from adhering. Re-install the fittings after the finish dries.

2 Move the bench to its shop position, and put shims under the feet to level it. Route the power cord through a floor-mounted cord cover available at a hardware or office-supply store. The cover protects the cord, and securing the cover to the floor with double-faced tape helps reduce a tripping hazard.

Written by Robert J. Settich
Project design and construction: Chuck Hedlund
Illustrations: Roxanne LeMoine; Lorna Johnson
Photographs: Wm. Hopkins; Baldwin Photography

two fast fixes for dust-collection woes

Clear the air in your workshop with these easy-to-make projects

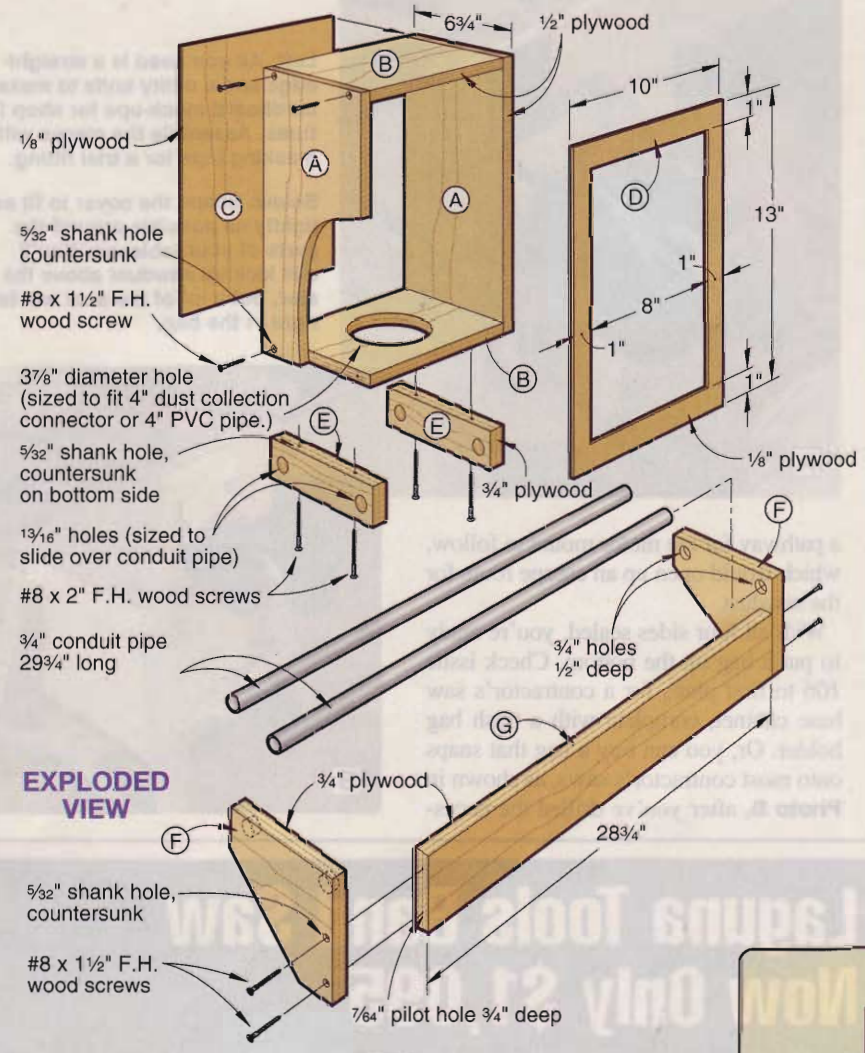
The less dust floating around in your workshop, the better. Not only does your shop stay cleaner, but, more importantly, your lungs stay healthier.

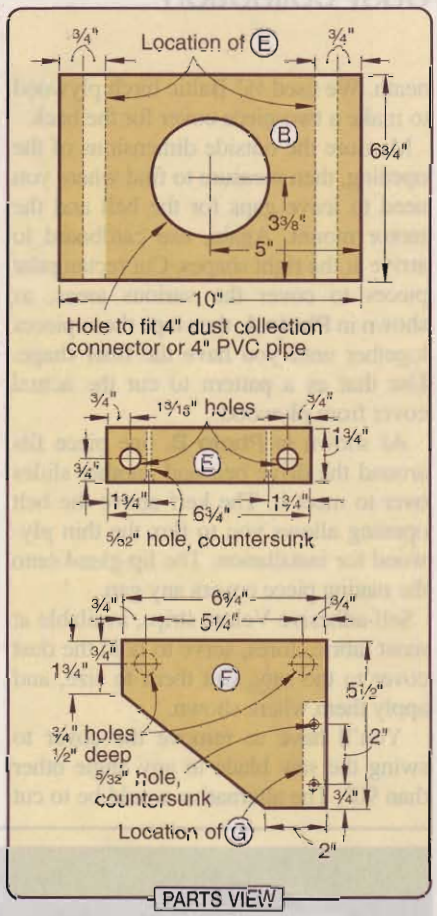
With that in mind, we developed two more dust-collection fixtures to add to the ones we've published over the years (see sidebar on *page 84*). Senior Design Editor Jim Downing came up with dust-catchers for a power mitersaw and a contractor's tablesaw, two notoriously messy machines.

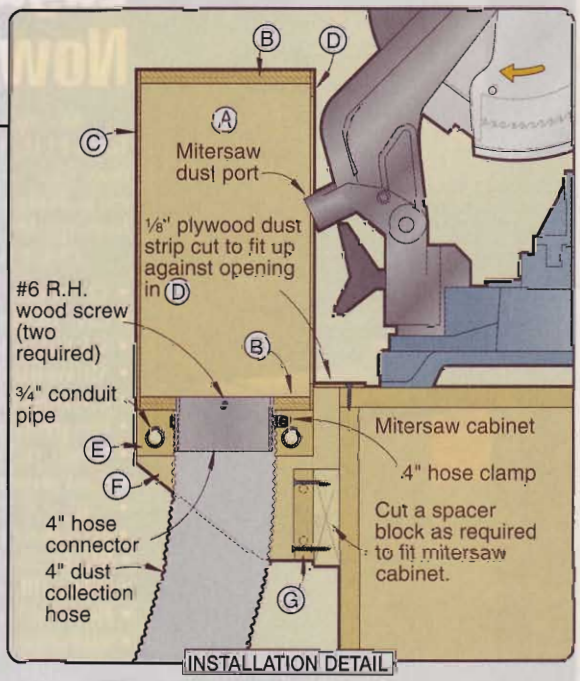
The mitersaw fixture accepts a 4" hose from a standard dust collector, while the tablesaw addition directs sawdust into a bag that hangs beneath it. In the process, we used a method that will come in handy whenever you're designing your own shop fixtures. We cut our prototypes out of cheap, easily shaped cardboard.

Tame your mitersaw

Dust-collection bags come as standard equipment on many mitersaws, but a lot of the sawdust never



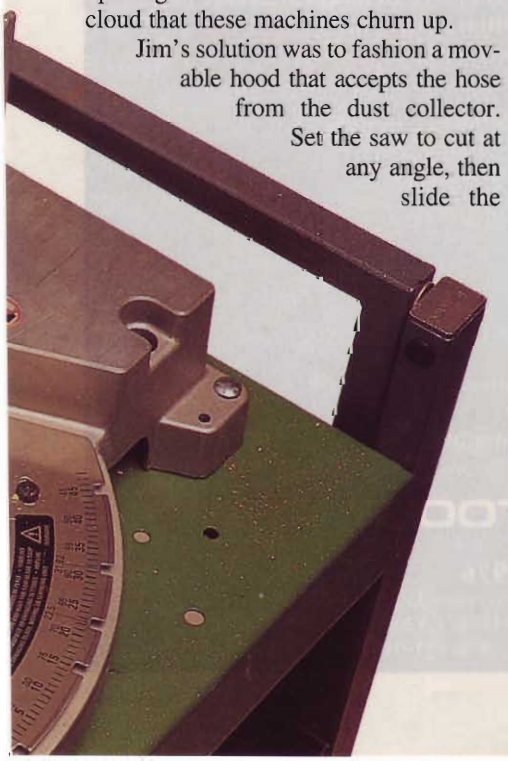



Mitersaw dust port
⅛" plywood dust strip cut to fit up against opening in D
#6 R.H. wood screw (two required)
¾" conduit pipe
4" hose connector
4" dust collection hose
Mitersaw cabinet
4" hose clamp
Cut a spacer block as required to fit mitersaw cabinet.
INSTALLATION DETAIL

finds its way inside. You need a big opening and lots of air flow to corral the cloud that these machines churn up.

Jim's solution was to fashion a movable hood that accepts the hose from the dust collector. Set the saw to cut at any angle, then slide the hood into the ideal position for sucking up the dust. We built the hood and brackets with Baltic birch plywood, and used aluminum electrical conduit for the rails. See the drawings on *this page* for the building details. Our hood is designed to fit the commercial work cart that holds our mitersaw.

We went through a couple of very different designs before settling on this option. We saved a lot of time by making our prototypes from corrugated cardboard, cut from a box.



Seal up your tablesaw

Contractor's saws cost less than the cabinet style, but they spew all of the sawdust right into your workshop. Here's a simple way to set up a line of defense. Most contractor models are enclosed on three sides, but open on the back, where the motor hangs, and under-

neath. We used ⅛" Baltic birch plywood to make a two-piece cover for the back.

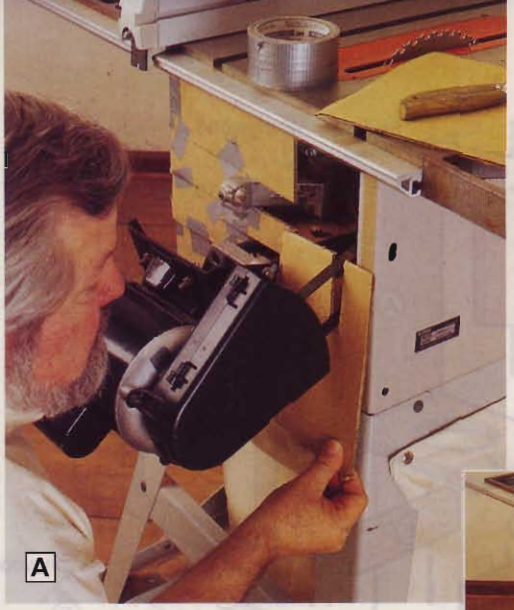
Measure the outside dimensions of the opening, then measure to find where you need to leave gaps for the belt and the motor mount. Again, use cardboard to arrive at the right shapes. Cut rectangular pieces to cover the various areas, as shown in **Photo A**, then tape those pieces together until you have the final shape. Use that as a pattern to cut the actual cover from plywood.

As shown in **Photo B**, one piece fits around the drive belt and another slides over to meet it. The kerf above the belt opening allows you to flex the thin plywood for installation. The lip glued onto the mating piece covers any gap.

Self-adhesive Velcro strips, available at most fabric stores, serve to hold the dust cover to the saw. Cut them to size, and apply them where shown.

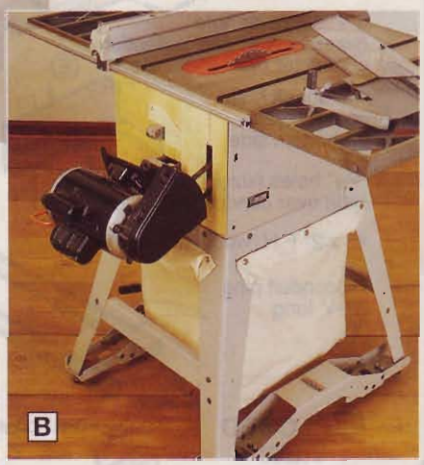
You'll have to remove the cover to swing the saw blade to any angle other than 90°. The alternative would be to cut a pathway for the motor mount to follow, which would open up an escape route for the sawdust.

With all four sides sealed, you're ready to put a bag on the bottom. Check issue 106 to find plans for a contractor's saw base cabinet, complete with a trash bag holder. Or, you can buy a bag that snaps onto most contractor's saws, as shown in **Photo B**, after you've drilled the neces-


A

Left: All you need is a straightedge and a utility knife to make cardboard mock-ups for shop fixtures. Assemble the pieces with masking tape for a trial fitting.

Below: Shape the cover to fit as tightly as possible around the parts of your tablesaw. You'll still kick up sawdust above the saw, but a lot of the dust will fall right in the bag.


B

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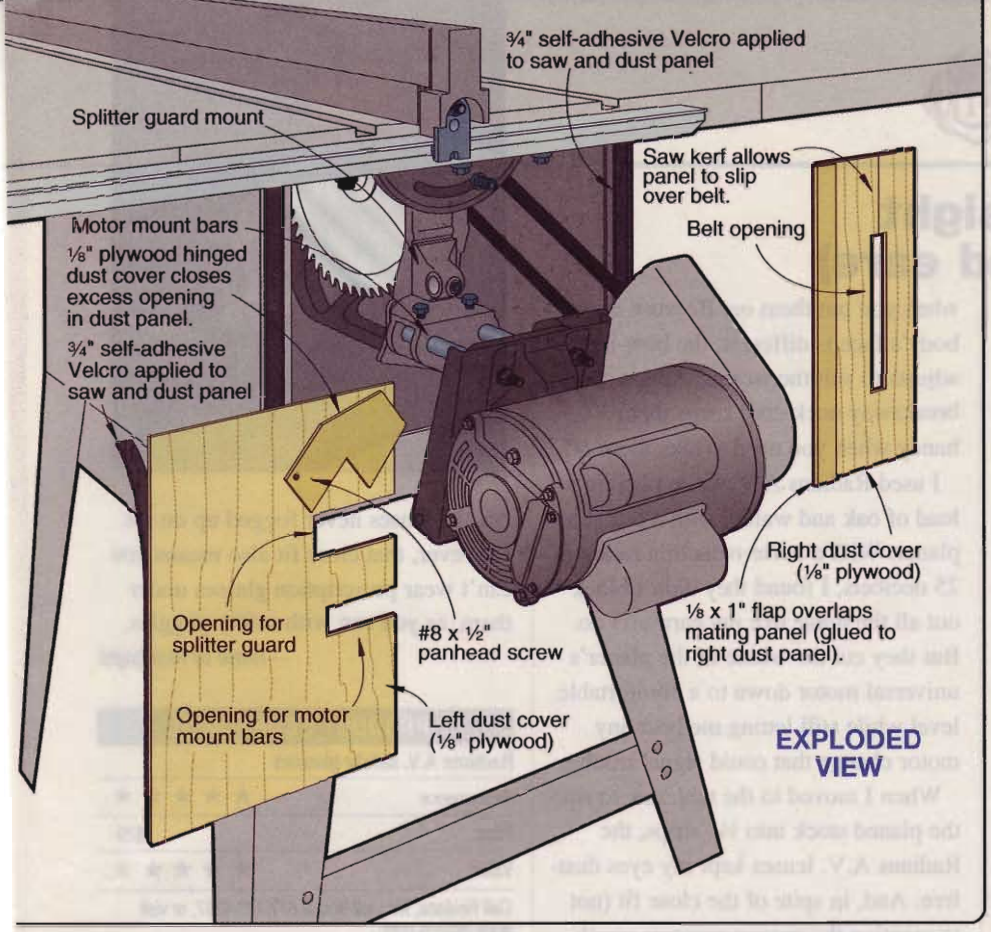
¾" self-adhesive Velcro applied to saw and dust panel
Splitter guard mount
Saw kerf allows panel to slip over belt.
Belt opening
Motor mount bars
⅛" plywood hinged dust cover closes excess opening in dust panel.
¾" self-adhesive Velcro applied to saw and dust panel
Right dust cover (⅛" plywood)
⅛ x 1" flap overlaps mating panel (glued to right dust panel).
Opening for splitter guard
#8 x ½" panhead screw
Opening for motor mount bars
Left dust cover (⅛" plywood)
EXPLODED VIEW

sary holes. Order part number 140298 for $42.49, including postage, by calling Woodcraft at 800/225-1153 or log on to www.woodcraft.com.

Written by **Jim Pollock** with **James R. Downing**
Photographs: **Baldwin Photography**
Illustrations: **Kim Downing; Lorna Johnson**

Blasts from the past

We've published plans for many shop-built fixtures to help you collect dust. To handle some of the other machines in your workshop, take a look back at these articles:

- **Radial-arm saw and portable planer**, issue 43
- **Drill press**, issue 59
- **Bandsaw**, issue 99
- **Tablesaw**, issue 119
- **Planning an entire dust-collection system**, issues 43 and 96.

To order back issues, call 800/346-9663. For article reprints, write to 1716 Locust St., GA310, Des Moines, IA 50309-3023, and enclose $5 per article.

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10" x 30 T (1/8" or 3/32" K)	~~$ 99~~	$ 89	$ 84
8 1/4" x 40 T (3/32" Kerf)*	~~$ 99~~	$ 89	$ 84
8" x 40 T (3/32" Kerf)	~~$ 99~~	$ 89	$ 84
7 1/4" x 30 T (3/32" Kerf)	~~$ 89~~	$ 62	$ 59
5 3/8"x40Tx10mm(5/64" K)**	~~$ 89~~	$ 80	$ 76

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12" x 80T x 1"	~~$149~~	$134	$127
15" x 100T x 1"	~~$199~~	$179	$169

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Woodworker I

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Safety combo a sight for sore eyes (and ears)

Every woodworker knows about wearing safety glasses, but too many of us ignore the dangerous effects of shop noise. That is, until we're getting fitted for a hearing aid or can't sleep at night for the ringing in our ears.

Radians A.V. protected my eyes with wide, wraparound lenses that fit closely to my face and gave me an unobstructed view of my work. But instead of traditional bows that loop over the tops of your ears, the end of each bow holds a washable, gel-filled ear plug, which I found much more comfortable than the foam-style plugs that you "squeeze and stuff" into your ear canal.

Because the ear plugs are what keep the Radians A.V. glasses on your face, you can't help but protect your ears when you put them on. Because everybody's face is different, the bow-length adjusts to suit the wearer. And, a short breakaway neck cord keeps them handy when you need to take them off.

I used Radians A.V. while planing a load of oak and walnut with a portable planer. With a noise-reduction rating of 25 decibels, I found they didn't block out all the noise like my earmuffs do. But they cut the whine of the planer's universal motor down to a comfortable level while still letting me hear any motor change that could signal trouble.

When I moved to the tablesaw to rip the planed stock into ¼" strips, the Radians A.V. lenses kept my eyes dust-free. And, in spite of the close fit (not to mention the muggy summer weather), the lenses never fogged up on me. However, that close fit also means you can't wear prescription glasses under them, as you can with safety goggles.

—Tested by Rich Bright

PRODUCT SCORECARD

Radians A.V. safety glasses	
Performance	★★★★★
Price	$20
Value	★★★★½

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This WoodChuck can chuck wood

There's never enough room in my shop or my toolbox, so when I find a tool that does more than one job well, I like to keep it handy. The WoodChuck chisel/wood rasp combo fills the bill pretty well, without filling the bucket. The folks at Cooper Tools created a half-moon sectioned rasp, and ground a bevel-edge on the end that allows one WoodChuck to serve as a chisel, flat rasp, and half-round rasp.

The set of three WoodChucks I tested came nice and sharp from the factory. I used the chisel to cut a hinge mortise into a door, and it performed as well as any chisel I've used previously. However, when cleaning up the sides of a deep mortise in oak, such as the table leg shown *above*, I was tempted to go back to my regular chisels. Why? Because the rasp surface is only 1" from the cutting edge of the chisel, and I found myself unnecessarily abrading the edge of the mortise with the rasp when I exceeded that depth.

The rasp faces of the WoodChuck tend to cut deeper than a traditional rasp, making it aggressive. When using the rasp in a two-handed fashion, I got a little squeamish putting my fingers so close to the sharp chisel edge, but the plastic tip cover that comes with the tool put me at ease. I also liked the oversized plastic handles, which felt comfortable in my oversized hands. A steel strike plate on the butt of the handle took the stoutest hits I could dish out. Unfortunately, it doesn't extend through to the blade shank, so the handle might eventually crumble under too hard of a blow.

PRODUCT SCORECARD

Nicholson WoodChuck

Performance	★★★½☆
Price	$10-12 individually; $22, set of three
Value	★★★½☆

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WoodChucks come in ½", ¾", and 1"-wide blades. The full set of three costs about twice as much as one tool.

—Tested by Jeff Hall

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50 woods for 50 years

PHOTOGRAPHS: WARREN ATKINS; THE THOMPSON'S COMPANY

Warren Atkins' "50th Anniversary Bowl," *far right,* made from 50 wood species, stands 12" tall with a 12" diameter.

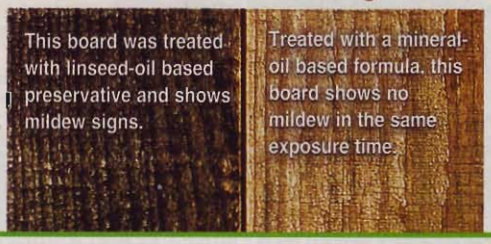
When a man loves wood nearly as much as his wife, why not combine those loves into a symbolic project? That's exactly what San Mateo, California, woodturner Warren Atkins, 82, did for he and his wife Sally's 50th wedding anniversary.

For the beautifully patterned, segmented bowl, *right,* Warren turned to 50 different native and exotic wood species, one for each year of their happy marriage. With his wife's appreciation of beauty in mind, he carefully selected species and grains that complemented each other, then added some accents. In the bowl, which he finished with several coats of sanded lacquer topped with wax, Sally found figured quilted maple, beech, ash, Sitka spruce, redwood lace burl, claro walnut, ebony, sedua, ipe, kingwood, koa, zebrawood, and 38 others. A woodworker since the early 1950s and a woodturner since 1984, Warren frequently sells his work to local galleries that specialize in wood items.

Linseed oil loses in fight with mildew

The U.S. Forest Products Laboratory in Madison, Wisconsin, has found that linseed oil as a major ingredient in a clear exterior finish actually promotes mildew growth on wood. That's because linseed oil, or other natural oils derived from seeds or nuts, form a fungi food source.

Dr. Victoria Scarborough, head of the research and development staff at the Thompson's Company (800/367-6297) can underscore the Forest Products Laboratory's findings. Thompson's hired an independent lab to test two exterior waterproofing formulas—one with a linseed oil base and the other with mineral oil. Placed outside for six months, the linseed oil formula showed mildew growth.


This board was treated with linseed-oil based preservative and shows mildew signs.
Treated with a mineral-oil based formula, this board shows no mildew in the same exposure time.

THE STOCK MARKET

Scientists find second-hardest substance

It's not quite as hard as the diamond, the world's hardest substance, but it's a lot cheaper for industrial uses. That's the claim of Alan Russell and Bruce Cook, scientists at the Ames Lab, a U.S. Department of Energy facility on the Iowa State University campus in Ames.

And large corporations have an interest. Black & Decker might use the new substance, aluminum magnesium boride, as the coated edge of cutting tools to increase wear resistance. Johnson & Johnson is wondering about its application to surgical instruments. 3M and General Electric also have asked some leading questions.

It's all because manufacturers presently use diamond and cubic boron-nitrate—the previous second-hardest substance—on many cutting machines. But those two substances each cost about $2,000 a pound. Aluminum magnesium boride comes in considerably less at about $700 for the same amount.

If aluminum magnesium boride lives up to its commercial promise and becomes a dominant machining material, Iowa State University, which will hold the patent, will get big dollars. If not, the substance may only find a few niche applications. Its industrial potential has yet to be proven.